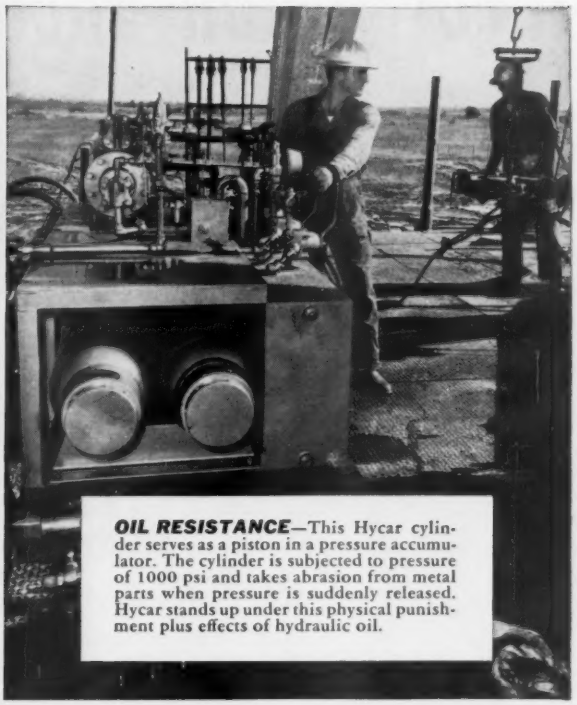
News about

B.F.Goodrich Chemical *raw materials*

RESILIENCE—A Hycar blanket fits around this cylinder that presses paper down on a printing press surface. The Hycar must "give" under pressure, yet snap back through millions of impressions, retaining original thickness within a thousandth of an inch.



OIL RESISTANCE—This Hycar cylinder serves as a piston in a pressure accumulator. The cylinder is subjected to pressure of 1000 psi and takes abrasion from metal parts when pressure is suddenly released. Hycar stands up under this physical punishment plus effects of hydraulic oil.

LONG WEAR—These roller skate wheels prove Hycar's exceptional wearing qualities. Wheels maintain perfect balance and roundness, keep a good grip on the surface. Hycar is easily molded for products like this, retains high dimensional stability.

How HYCAR AMERICAN RUBBER meets many requirements

HYCAR can be compounded to fit the needs of specific jobs like these. Hycar is resistant to oil, most solvents and chemicals, aging, and abrasion. Send for booklet listing properties of standard materials. Write Dept. EP-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
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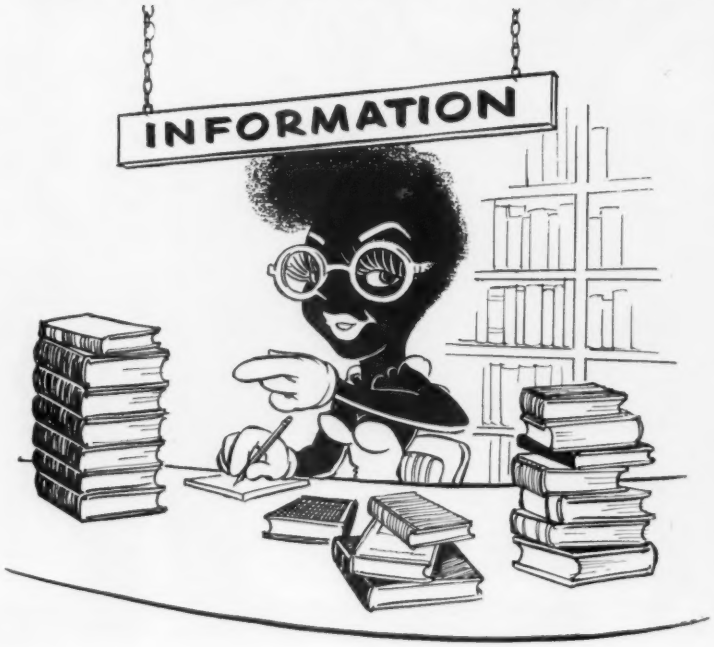
Take full advantage of all the helpful services available to you. For full information consult your Phillips technical representative.



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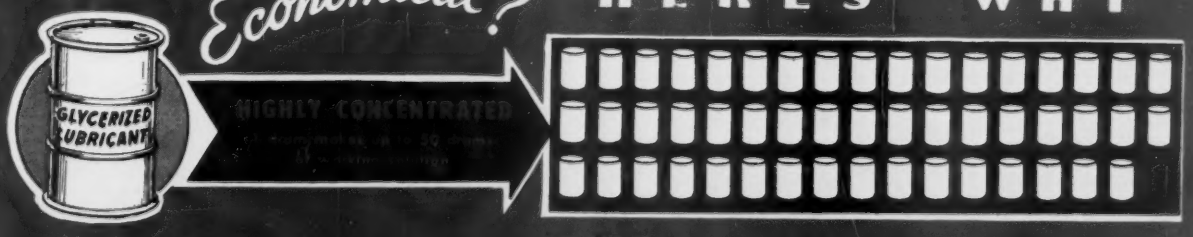

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Hi-Sil, a white reinforcing pigment of extremely fine particle size, is an exclusive product of Columbia-Southern. For further information, table of properties, or experimental working samples, write today to Hi-Sil Department at our Pittsburgh address.

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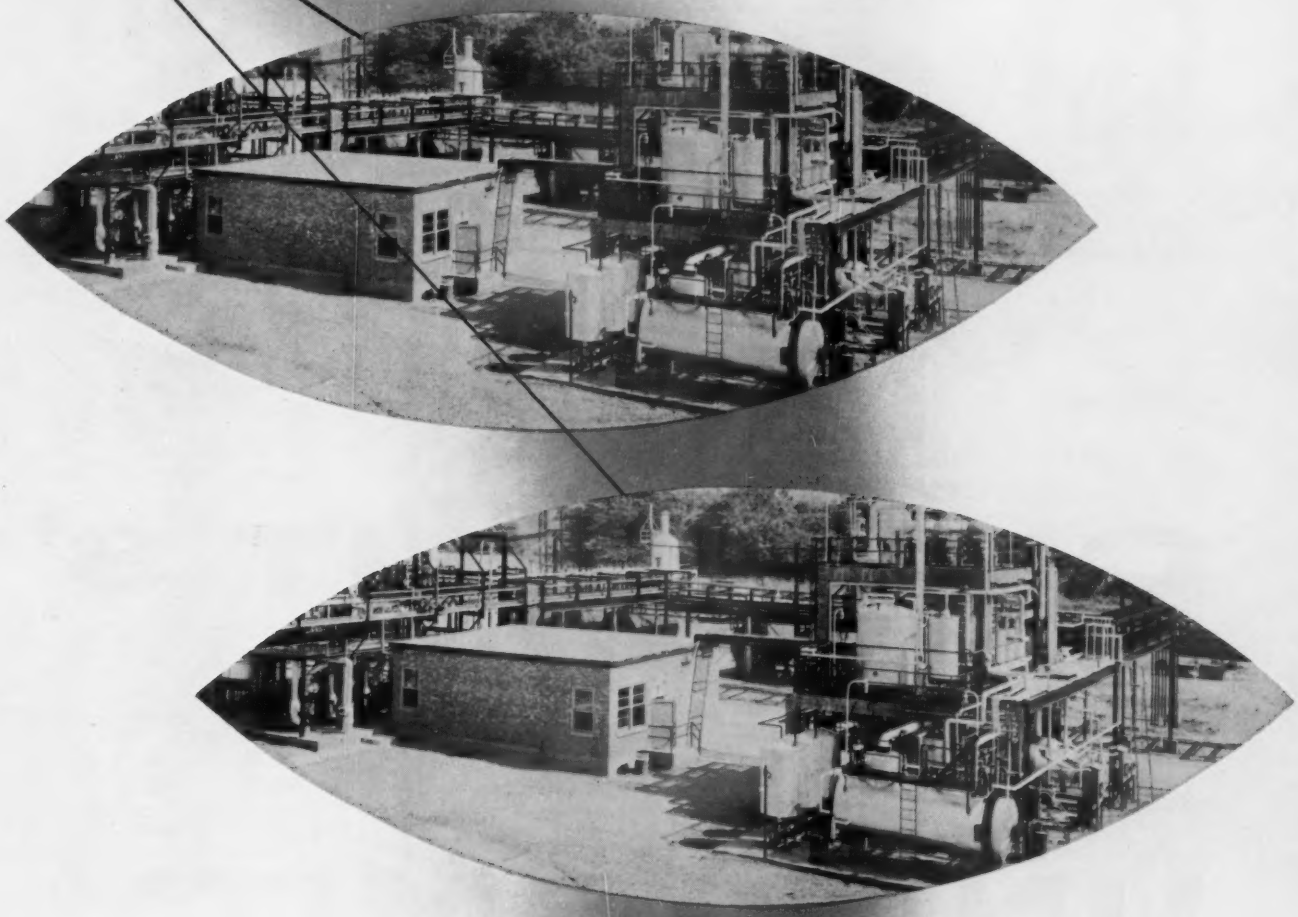

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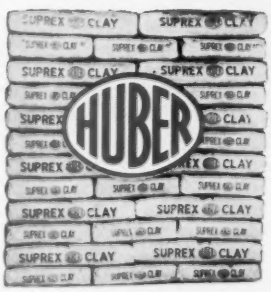

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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CONTENTS

VOL. 79, NO. 2 **MAY, 1956**

Properties of GR-S as Affected by Antioxidants—*By W. K. Taft, June Duke, Dorothy Prem and T. B. Harrison* 267
Includes an evaluation of various types of antioxidants as they affect the physical properties of GR-S type compounds when heat softened, milled or treated in a Banbury.

Temperature Studies of the Air in a Truck Tire—*By G. G. Richey, R. H. Hobbs and R. D. Stiehler* 273
An illustrated description of a method whereby the temperature of the air in a rotating truck tire can be accurately measured.

Meeting Power Requirements of the Rubber Plant with Large A-C Motors—*By C. E. Buchan* 277
An analysis of the large power requirements special to milling and mixing rubber. Includes illustrations of these motors as applied to mills and Banburys in various rubber plants.

Graphic Wattmeters Operate Effectively on Banbury Mixers 283

DuPont's New Elastomers Laboratory: A Photo Story..... 284

Autogenous Extrusion—*By A. N. Gray* 286
A description of an extruder in which plastic materials may be extruded without external aid in the form of heating or cooling devices.

How Pioneer Tire Company Recaps Surplus Half-Track Treads—*By William B. Brown* 289

Sensitive Calorimeter for Polymer Studies 291

Book Reviews	346	Markets	350
Canadian News	326	Names in the News	316
Chemical Prices	*	New Equipment	338
Classified Ads	366	New Goods	330
Coming Events	306	Obituaries	328
Editorials	293	Statistics	356
Financial News	318	West Coast News	324

*Appears every other month

Microfilm copies of complete volumes of RUBBER AGE are available from: University Microfilms, 313 North First St., Ann Arbor, Mich.

Indexed in Industrial Arts Index and Engineering Index

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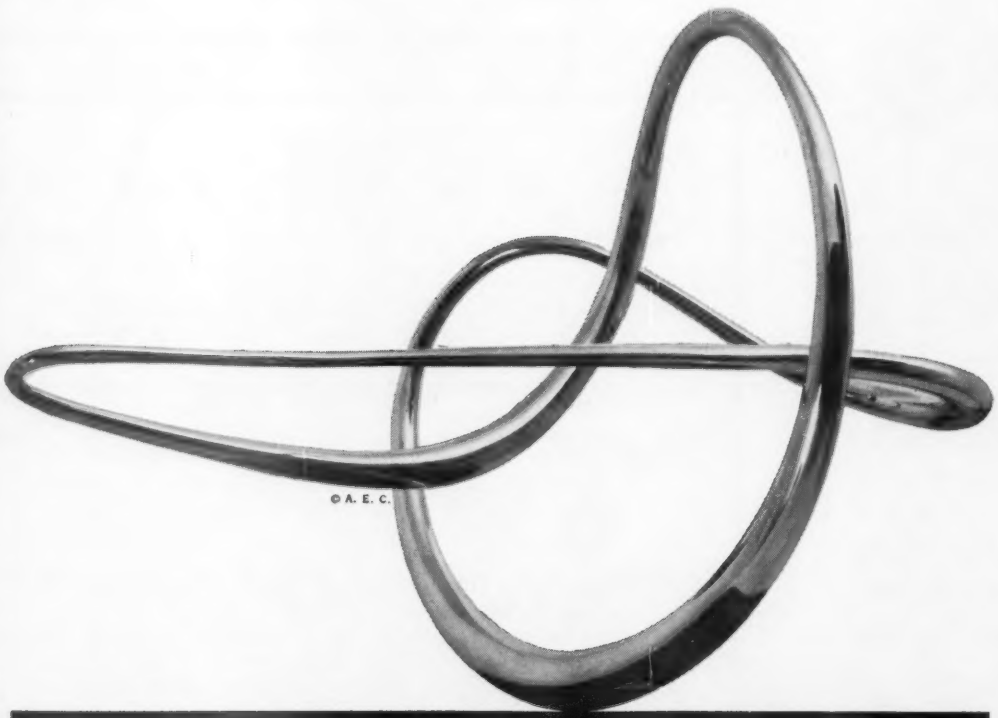

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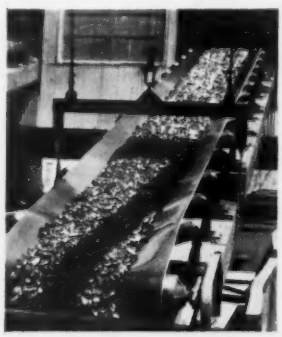

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Goodyear
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three new
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types of Plioflex
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of properties and costs, ideally su

Plioflex 1006

– a hot, nonextended, styrene rubber

Pliofl

– a cold, oil mast
naphthenic oil),

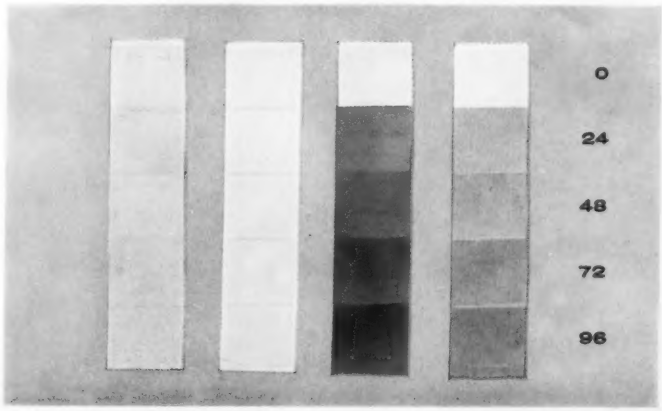
Here's how they compa

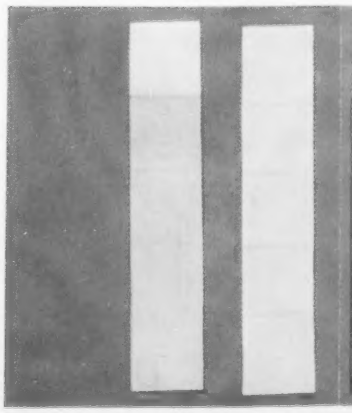
story of the color improver

GR-S 1006 PLIOFLEX 1006

GR-S 1703 PLIOFLEX

Here's proof of color s





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, oil masterbatch (25 pts.
henic oil), styrene rubber

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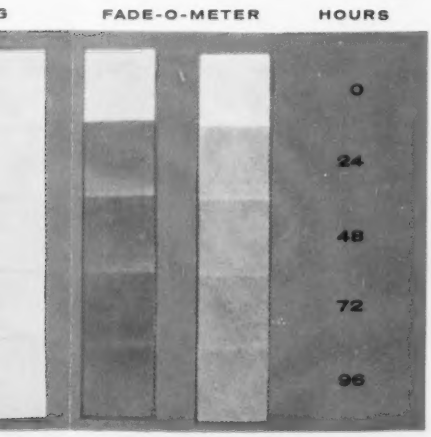
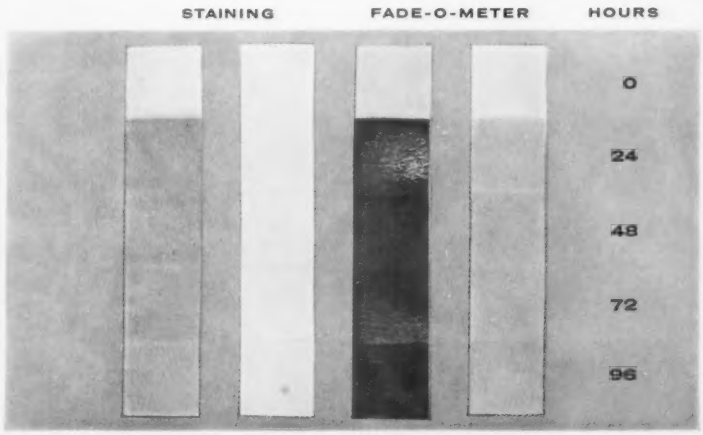
Results of prolonged exposures to ultraviolet light graphically illustrate the ability of the new PLIOFLEX rubbers to resist staining and color change:





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makes available

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three new

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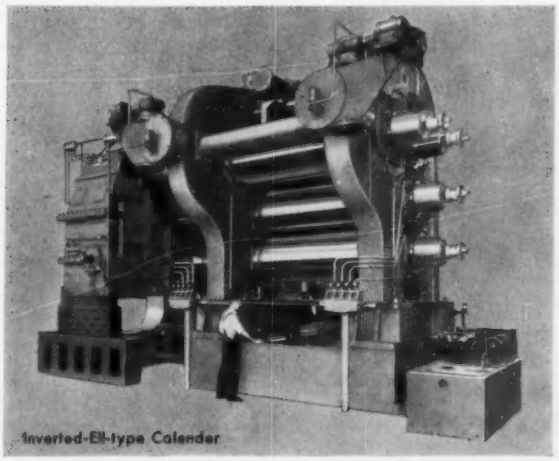
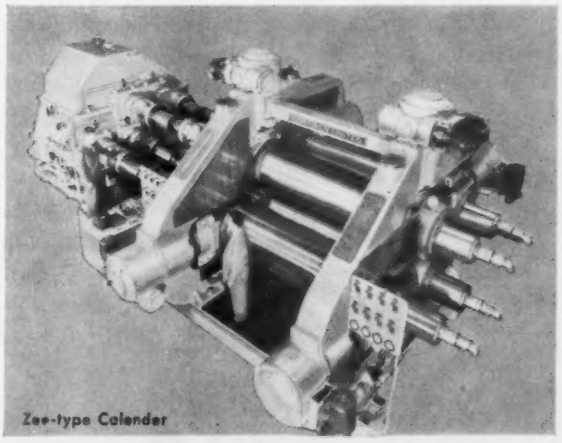


Inverted-Ell-type Calender

Crossed axis is useful in changing roll profile, but for extremely accurate and uniform gauge, the usefulness of crossed axis is limited. With the patented, hydraulically-operated, and controlled ROLL BENDING UNIT, limitations of roll crossing are greatly reduced. In many calendering operations, ROLL BENDING eliminates the need for crossed axis and the accompanying expensive pinion-stand drive.



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Users of roll benders in the United States and Canada report results exceeding best expectations. New calenders are now under construction for delivery this year, equipped with roll benders on one or more rolls.

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Letters to the editor

Tire Inventories

Dear Sir:

I believe your editorial on the subject of "rubber prospects," appearing in your April 1956 issue, leaves much to be desired. This is particularly true with respect to the paragraph on tire inventories where you use the words "some panic might be felt in the tire industry." This statement is based on an estimate of tire inventories in manufacturers' hands which you claim crept close to the 19 million mark in recent weeks.

To begin with, you do not state what inventories you are talking about. What kinds of tires are included in your 19 million figure? Does it represent passenger car tires, truck tires, airplane tires, agricultural tires, or just what?

Secondly, the mere size of an inventory is of little significance unless it is related to sales in terms of months supply, for certainly as sales increase it is necessary to correspondingly increase inventories to service the increased sales. Actually, a low inventory in terms of units could be dangerously high during a period of low sales when measured in terms of months supply.

Thirdly, it happens that at this time the industry is going through a period when inventories must necessarily be higher because of the introduction of tubeless tires. This requires increasing stocks to carry both conventional and tubeless tires in all popular sizes. This is further multiplied when you consider that both types must be carried in black and white sidewalls. In addition, some companies are producing tires in colors other than black and white.

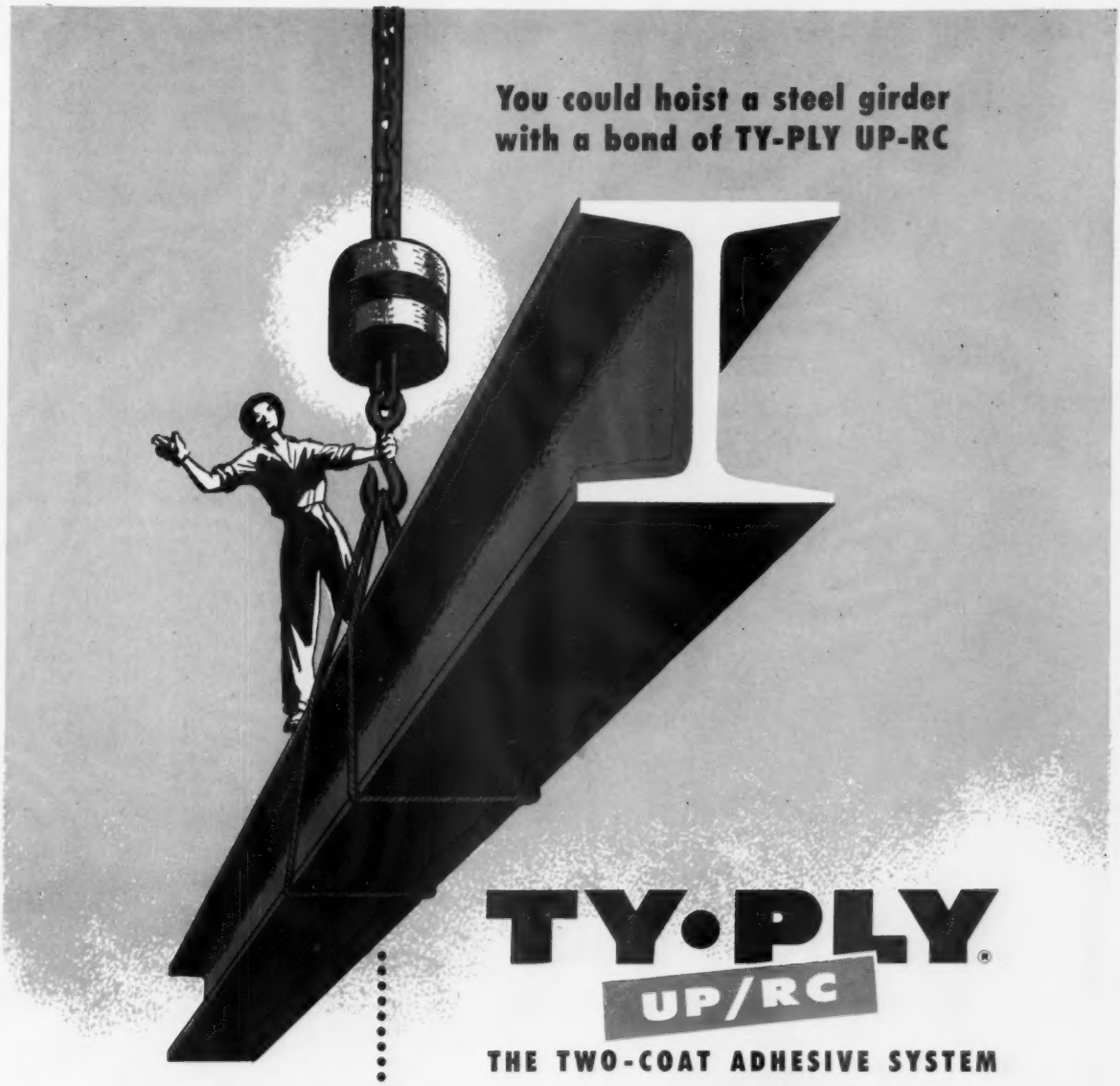
All of these factors tend to increase the size of inventories necessary to service a given volume of sale.

Now, let us come to the figure that you refer to as "dealer stocks," which you state is around the 12 million unit level. To begin with, there are no available statistics on dealers' stocks. Fortunately, we do have some highly confidential figures secured by sampling surveys which give us some knowledge of dealers' stocks, but, unfortunately, these figures cannot be revealed to you.

All I can tell you in this regard is that your figure is extremely inaccurate for what it is labeled. Therefore, you have used a figure without knowledge as to what it represents without any comparative data so that no judgment could be formed as to whether it is high or low.

I respectfully recommend to you that before publishing figures of this type, as well as forecasts of rubber consumption, that considerable study be made of the factors involved without jumping too quickly to conclusions to be written up in editorial form.

C. W. HALLIGAN
Rubber Mfrs. Assn.
New York 22, N. Y.



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Reader Halligan is, of course, correct in his implication that some of the statements made in the editorial should have been broadened to spell out specifics. This is generally difficult when editorializing to space requirements. However, the figures we used came from thoroughly reliable sources and we believe they reflect current inventory conditions. As to "dealer stocks," we are aware that there are no "official" statistics and it is to be regretted that whatever figures are secured are hidden in confidential files.—ED.

Scrap Plastics

Dear Sir:

As a reader of many years standing, I would like to take this opportunity to commend you for the general excellence of your publication. I make particular reference to the wide coverage offered in your section on markets of interest to the rubber industry. There is a suggestion I would like to make at this time, however. In view of rapidly changing technological conditions, don't you think a section should be added commenting on rubberlike plastics scrap? These scrap materials are finding increasing use in the industry and I believe that comments as to price and market conditions would be a most valuable addition. Have any other of your readers expressed the same opinion?

ALFRED PURDON

Lynn, Mass.

Help Needed

Dear Sir:

We are desirous of obtaining repairs for Parsons Beam Die Cutting Machines formerly manufactured by the Parsons Machinery Co., Marlboro, Mass. We would like to learn who acquired this company so that we may contact them direct.

F. D. KETTERING

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Dear Sir:

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Memo from the Editor

The "Letters to the Editor" columns were recently inaugurated. They are open to all of our readers and we invite you to send along your comments for publication. These comments may be specifically applied to published articles and news items or may reflect your own views on any facet of the rubber industry. We reserve the right to edit all material. Address: Editor, RUBBER AGE, 101 West 31st St., New York 1, N. Y.

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If you manufacture vinyl stock for the fast-growing automotive upholstery field—or any other product that requires a plasticizer with excellent low temperature and low volatility properties—you'll get better results and greater economy with Pittsburgh PX-220 DiIso Decyl Adipate.

PX-220 is being specified by more auto upholstery makers every day because it provides an ideal combination of properties: Superior low temperature flexibility, good hand and drape, very low volatility and low water extraction. And the low specific gravity of PX-220 may enable you to make appreciable savings in your final costs.

Aren't these advantages that are worth looking into *right now?* We'll gladly send you specifications and other technical data on Pittsburgh DiIso Decyl Adipate. *Write today for Bulletin No. 220.*

See How PITTSBURGH Serves the Plastics Industry at
BOOTHS 624-626
7th National Plastics Exposition
June 11-15 New York Coliseum

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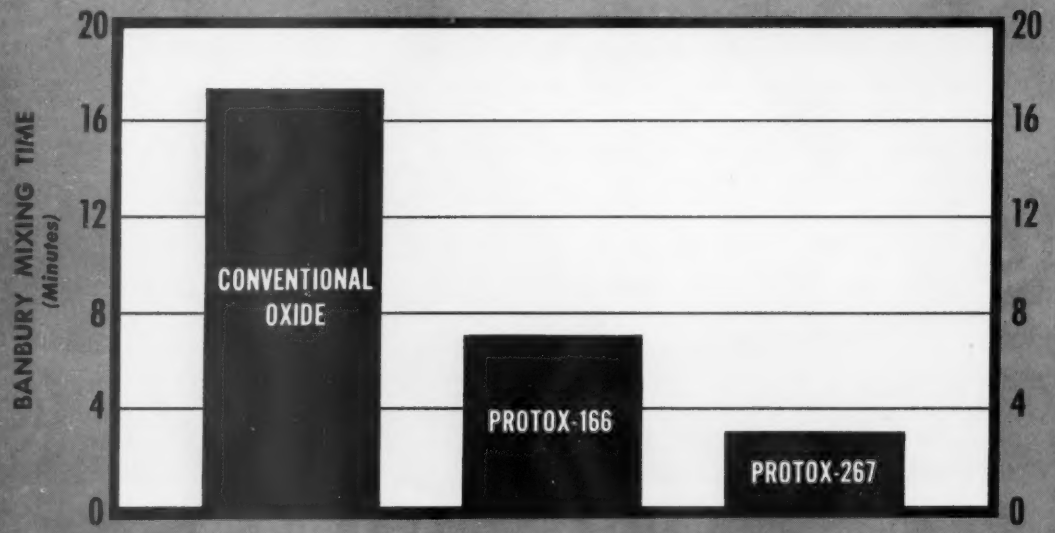
COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

HOW PROTOX* ZINC OXIDES Cut Banbury Mixing Time



(70-30 ZINC OXIDE-RUBBER MASTERBATCH)
(N. J. Z. LABORATORY TEST)

PROTOX-166

Mixes faster than conventional unpelleted American Process zinc oxides of similar particle size. The reason: It is surface-treated with propionic acid. Rubber readily wets the zinc propionate coating on Protox-166 and disperses that oxide fast and thoroughly.

PROTOX-267

Mixes even faster than Protox-166 because it is both surface-treated with propionic acid and pelleted. In short, it is pelleted Protox-166. The pellets incorporate rapidly into rubber and the propionate coating results in quick dispersion.

So whether you use an unpelleted or a pelleted zinc oxide, choose a Protox grade to cut Banbury mixing time.

Protox zinc oxides come in a range of particle sizes to meet all your needs. And, most important, only Protox oxides have the unique propionate surface for fast mixing and thorough dispersion.

***U. S. Patents 2,303,329 and 2,303,330.**

THE NEW JERSEY ZINC COMPANY

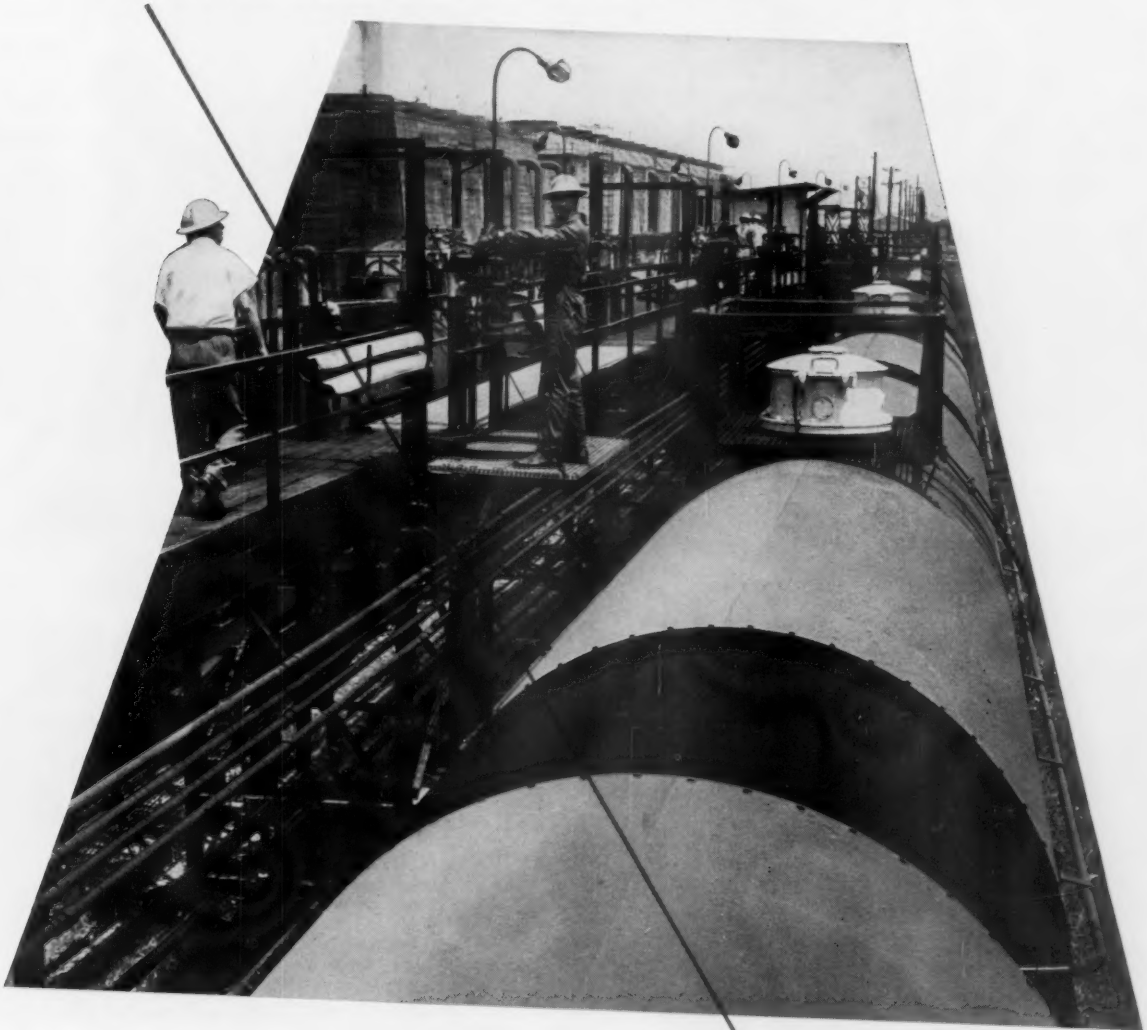
Producers of Horse Head Zinc Pigments

... most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.

HORSE HEAD PRODUCTS

soon there'll be more



Our Houston butadiene plant is operating well above rated capacity, primarily for GR-S rubber use.

But butadiene can foster a wide range of better plastics, fibers, coatings, films, adhesives, elastomers, etc., once it becomes freely available in volume. That is why we are expanding capacity by more than 50%.

Discussion of your needs for butane-derived petrochemicals is cordially invited.

PETRO-TEX CHEMICAL CORPORATION

HOUSTON 1, TEXAS

A JOINT ENTERPRISE OF

FOOD MACHINERY AND CHEMICAL CORPORATION AND TENNESSEE GAS TRANSMISSION COMPANY

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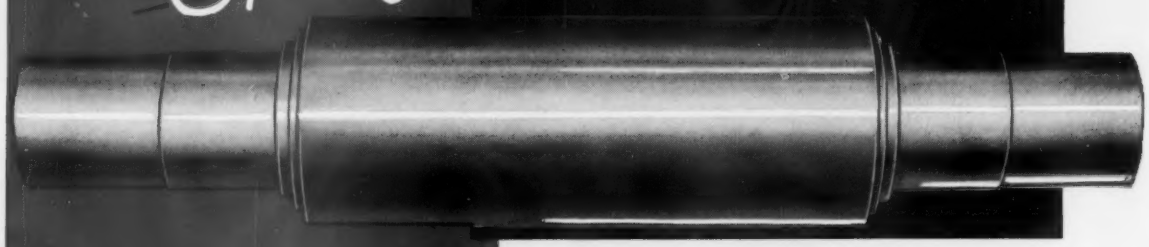
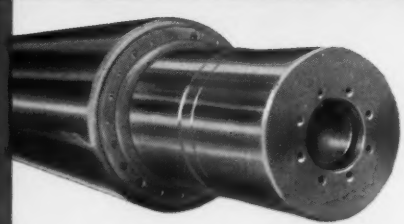
UNIFORMITY
PRECISION
DEPENDABILITY
are factors . . . .
Specify

UNITED®
DRILLED-TYPE
ROLLS





for the precision
calendering of
PLASTICS
RUBBER
TILE
LINOLEUM
or any materials requiring
close heat control

Our more than 50 years' experience in the design and manufacture of rolls can be helpful in solving your processing problems. Your inquiry is solicited.

UNITED Precision Ground, DRILLED-TYPE ROLLS, the result of careful metallurgical control over raw materials, and of strict quality control in every phase of manufacture . . .

MAINTAIN A UNIFORM ROLL SURFACE TEMPERATURE throughout, with minimum deviation at any point.

ASSURE FULL RANGE HEATING and cooling over wide temperature ranges.

PROVIDE ACCURATE, QUICKLY RESPONSIVE TEMPERATURE CONTROL.

UTILIZE FULL ROLL FACE with new, ring closure type designs.

PERMIT ADJUSTMENT OF RING CLOSURE GASKET AND BOLTS, WITH ROLL IN PLACE in calender or mill, thus eliminating production downtime due to roll removal.

MAINTAIN CORRECT DEPTH OF CHILL for iron or alloy iron rolls.

ARE ENGINEERED AND DESIGNED FOR MAXIMUM HEAT TRANSFER RATE with accurately drilled, fluid passages.

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ENGINEERING AND FOUNDRY COMPANY
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Plants at • Pittsburgh • Vandergrift • Youngstown • Canton • Wilmington (Lobdell United Division)
SUBSIDIARIES: Adamson United Company, Akron, Ohio
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Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

BAYTOWN

SYNTHETIC RUBBER

In mid-1955 United Rubber & Chemical Company, a subsidiary of United Carbon Company, purchased the Baytown, Texas, synthetic rubber plant of the RFC's Synthetic Rubber Division.

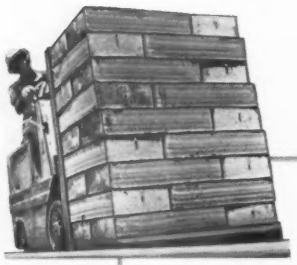
Since that acquisition thousands upon thousands of tons of Baytown synthetic rubber masterbatches have been sold both in the United States and abroad.

The name Baytown has gained prominence in the rubber industry. It is synonymous with dependability and uniformity, careful control and manufacturing excellence.

Commercial manufacture of black masterbatches was initiated at Baytown, and research still is being continued there to supply consumers with the best quality masterbatches that United Rubber can produce.

Baytown brands merit your confidence.

UNITED RUBBER AND CHEMICAL COMPANY



BAYTOWN MASTERBATCHES save you the job of mixing carbon black in rubber: United has done the task nicely, and has dispersed the black thoroughly and uniformly.

BAYTOWN MASTERBATCHES have the stamp of quality: they are stepping stones to achieving excellence in your end products.

BAYTOWN MASTERBATCHES are easy and convenient to handle. They are readily warehoused in a minimum of space. And using them will help keep your premises clean.

For greater progress in the preparation of your compounds, use . . .

BAYTOWN MASTERBATCHES

SALES AGENT

UNITED CARBON COMPANY, INC.

MANUFACTURER

UNITED RUBBER & CHEMICAL COMPANY

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UNITED CARBON COMPANY

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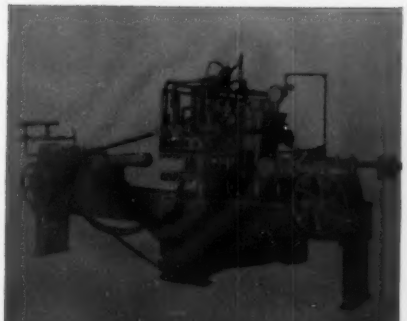
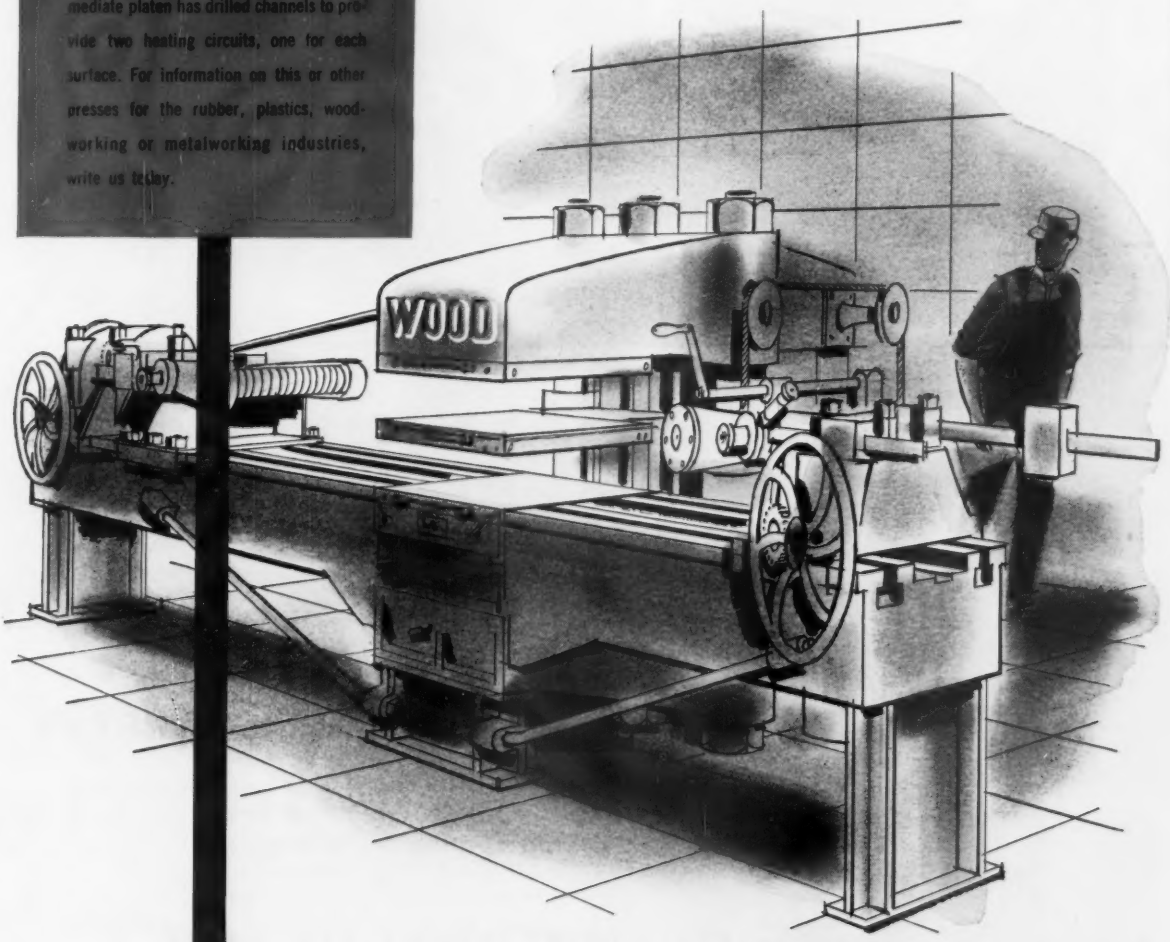


Open Gap 47-Ton Belt Press for curing flat and V-type transmission belts. The moving platen is accurately machined from a rolled steel slab and is guided by long, full-round babbitted guides on the strain rods. Intermediate platen has drilled channels to provide two heating circuits, one for each surface. For information on this or other presses for the rubber, plastics, woodworking or metalworking industries, write us today.

Prelude to low-cost production

When an R. D. Wood press swings into action, gratifying things happen to production costs. For, in most cases, production climbs to a new high and down-time for repairs approaches zero. The reason is the smooth, dependable performance of R. D. Wood presses—even under difficult conditions. And the reasons for this superior performance are the exacting standards set by R. D. Wood—in design, selection of materials, and craftsmanship. If your company's theme is low-cost production, here is your prelude—ready made.



R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

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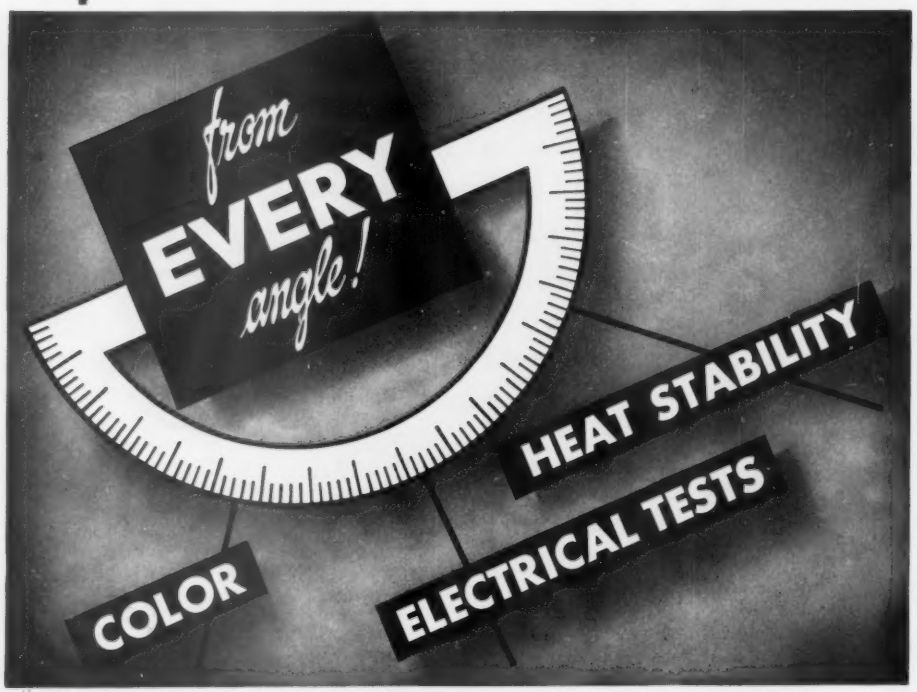
MAKERS OF HYDRAULIC PRESSES AND VALVES • FIRE HYDRANTS • CAST-IRON PIPE • GATE VALVES • GAS PRODUCERS • ACCUMULATORS



PIGMENT NO. 33

for Compounding

VINYLS AND SYNTHETIC RUBBER

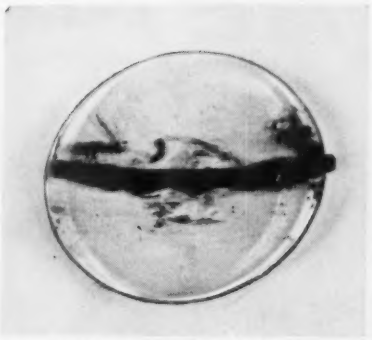
Sample and technical data sent promptly on request

SOUTHERN CLAYS, Inc.

33 RECTOR STREET
NEW YORK 6, N. Y.

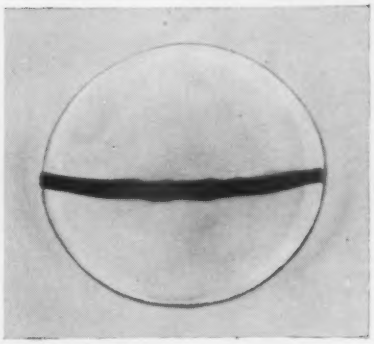
KEL-F® ELASTOMER
IS SHATTERING IDEAS ABOUT RUBBER

Challenging new fluorocarbon rubber has outstanding...
CHEMICAL RESISTANCE...HEAT RESISTANCE

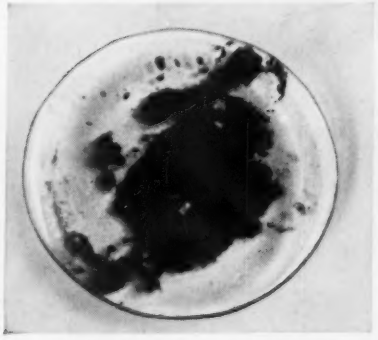


BUNA-N—10 min. immersion in RFNA

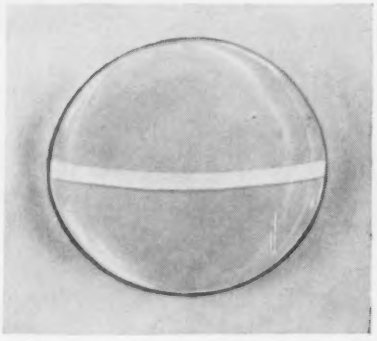
NATURAL RUBBER—10 min. immersion in RFNA



BUTYL—2 hr. immersion in RFNA



GRS—10 min. immersion in RFNA



KEL-F ELASTOMER—one week immersion in RFNA

IMMERSION IN RED FUMING NITRIC ACID for one week has no appreciable effect on the physical properties of KEL-F Elastomer. Extensibility and hardness remain virtually unchanged. Other available rubbers disintegrate within a matter of minutes.

When severe operating conditions demand a chemical rubber that *must* stand up under high temperatures and corrosive atmospheres—KEL-F Elastomer is the answer.

Developed by Kellogg, KEL-F fluorocarbon rubber combines superior elastomeric properties with excellent chemical resistance and thermal stability. Other outstanding advantages include: high chemical resistance to solvents, fuels and lubricants . . . low moisture absorption . . . non-flammability . . . excellent resistance to weathering and microorganisms.

This *unique* combination of properties makes KEL-F Elastomer useful in applications such as heat-and-chemical-resistant hose, tubing, diaphragms, gaskets, seals, tank linings, corrosion-resistant clothing, paints, flame-resistant coatings, and electrical insulation.

If your work requires an elastomer with outstanding resistance to heat and corrosion, look into KEL-F Elastomer. Our technical staff is prepared to assist designers, engineers, and production men in adapting KEL-F Elastomer to their individual needs. Kellogg supplies KEL-F Elastomer in the gum form only. Names of qualified fabricators of specific end uses of KEL-F Elastomer are available on request.

HOT OFF THE PRESS! *Our newly published booklet, "KEL-F Elastomer," is yours for the asking. Just fill out and mail coupon below for your free copy.*

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Subsidiary of Pullman Incorporated
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The THROPP 60" MILL

designed and built for

MAXIMUM EFFICIENCY–SUPERIOR PERFORMANCE –MINIMUM MAINTENANCE

This extra heavy duty 60" streamlined mill is designed and built in every detail to provide dependable uninterrupted production under the rigorous service conditions encountered in the Rubber and Plastics Industries.

Built-in herringbone gear speed reducers, with anti-friction roller bearings, insure proper alignment with master gear and pinion at all times. Fully enclosed frames and guards keep cleaning and maintenance costs down.

Thropp 42", 50", 72" and 84" mills for the Rubber and Plastics Industries are also available.

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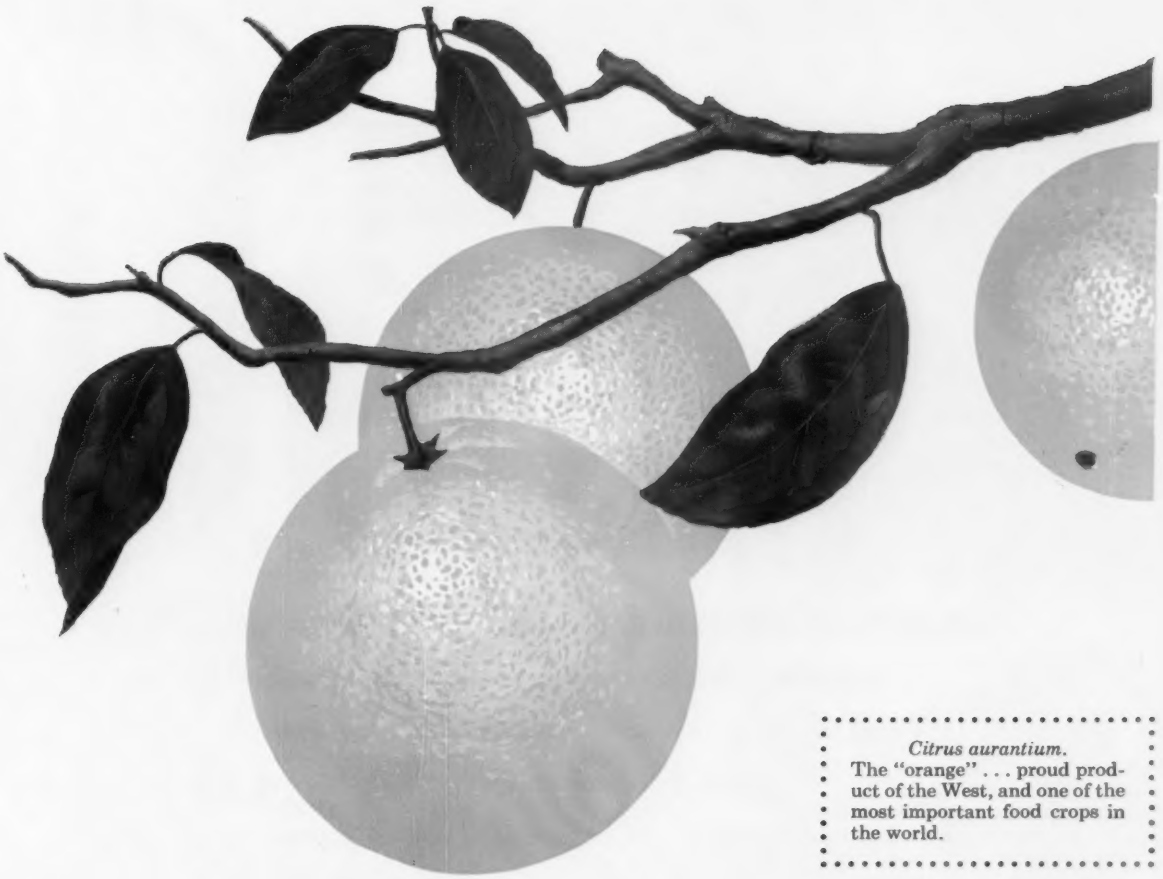
Division of J. M. LEHMANN COMPANY, Inc., 555 NEW YORK AVE., LYNDHURST, N. J.



Citrus aurantium.
The "orange" . . . proud product of the West, and one of the most important food crops in the world.

SYNTHETIC RUBBER

is a product of the West, too!

When you need rubber for sheeting, molded or extruded goods, tires or other uses—Shell Chemical is your convenient source West of the Rockies.

The Shell Chemical plant at Torrance, California, is one of the nation's best-equipped for the production of butadiene-styrene types of rubber. Convenient location and diversity of product make Shell Chemical your *logical* source in the West.

When you encounter troublesome technical problems—remember that the Shell Technical Service Laboratory will help you find practical solutions.

Next time you need synthetic rubber—write or call *Torrance, California.*

SHELL CHEMICAL CORPORATION
Synthetic Rubber Sales Division
P. O. Box 216, Torrance, California

SHELL

ST. JOE *Rubber Grade* ZnO

ST. JOE lead-free **ZINC OXIDES** are available in a complete series of grades for rubber compounds. Quality control from ore to oxide is one of St. Joe's most important production tools. This, together with prompt deliveries, unequalled and unbiased customer service, accounts for their rapidly increasing use in the industry.

FINE PARTICLE SIZE *Fast Cure*	**Black Label #20** **Red Label #30**
MEDIUM PARTICLE SIZE *Fast Cure*	**Green Label #42, #43**
MEDIUM PARTICLE SIZE *Slow Cure*	**Green Label #42A3** **Red Label #31**
FINE PARTICLE SIZE *Surface Treated*	**Black Label #20-21**
MEDIUM PARTICLE SIZE *Surface Treated*	**Green Label #42-21**
SPECIAL GRADES FOR LATEX	**Black Label #20** **Green Label #12, #46**
PELLETIZED GRADES *Surface Treated*	**Black Label #20-21 Pellets** **Green Label #42-21 Pellets**

Complete data on all grades, and samples for testing sent on request.

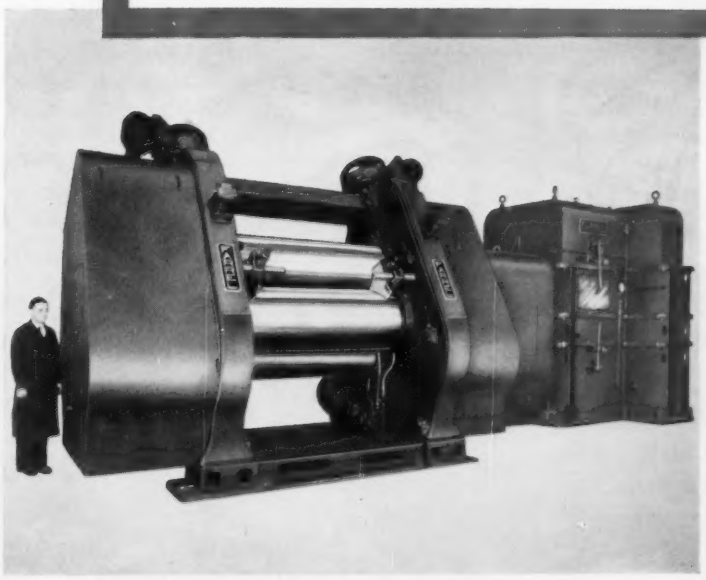
ST. JOSEPH LEAD COMPANY

250 PARK AVENUE, NEW YORK 17 • Plant & Laboratory: Monaca (Josephtown) Pa.

FOUR-ROLL "Z" CALENDER

A leading rubber company, in describing its new Farrel-Birmingham "Z" calender train for double-coating tire fabric, says that it "insures unmatched uniformity of quality". Ideal for high-speed production of film, sheet and coated fabrics, as well.

How to get maximum accuracy in calendering



THREE-ROLL TRI-ANGULAR CALENDER—The machine of the future for any type of production requiring high accuracy for two calendering passes. Right-angle arrangement of rolls provides closer control of gauge and easier feeding conditions.

F-B PRODUCTION UNITS

Banbury Mixers • Plasticators • Pelletizers • Extruders • Calenders • Mixing, Grinding, Warming and Sheeting Mills • Refiners • Crackers • Washers • Hose Machines • Bale Cutters • Hydraulic Presses and Other Equipment for Processing Rubber & Plastic Materials.

Recent and outstanding engineering contributions to the efficient conversion of raw material to finished product, are the Farrel-Birmingham four-roll "Z" calender and three-roll "Tri-angular" calender pictured here. These machines have established standards of calendering accuracy never before considered possible.

Among the refinements which contribute to this accuracy are motorized crossed-axes devices for fine adjustment of roll crown, and hydraulic pullbacks which hold the rolls in positive operating position.

When you bring your calendering problems to Farrel-Birmingham, you benefit from the experience and facilities that have gone into the development of machines like these. In fact, there's an excellent chance that the basic design for the "specialized" machine you require has already been worked out by Farrel-Birmingham engineers—and proved on the job.

Before you decide on a calender come to "calender headquarters". In the meantime, send for more information on the revolutionary "Z" and "Tri-angular" calenders.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Fayetteville (N.C.), Los Angeles, Houston

Farrel-Birmingham

FB-1019

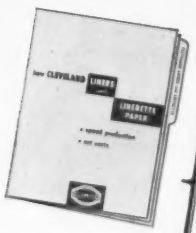
MR. CLIMCO SAYS....

Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio, U.S.A.
Cable Address: "BLUELINER"



ILLUSTRATED LINER BOOKLET

Tells all about Climco Liners and Linerette and how to get better service from liners. Write for your copy now.

CLIMCO
PROCESSED LINERS
Serving the Industry Since 1921

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

GEN-TAC®

helps to prevent "Curing Blows" like this!

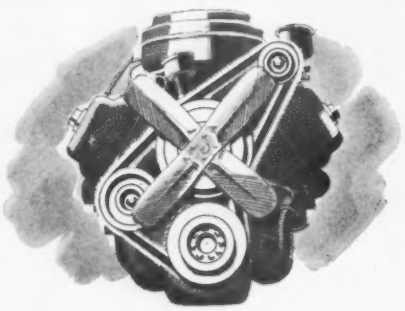
Curing blows are a familiar and costly sight in some factories. Gen-Tac cuts these losses to a minimum, because it is fast curing and develops its strength in the early stages of cure when internal pressures do the most harm.

Gen-Tac Vinyl Pyridine Latex is another "Industry-proven" product of the Chemical Division of The General Tire & Rubber Company, Akron, Ohio.

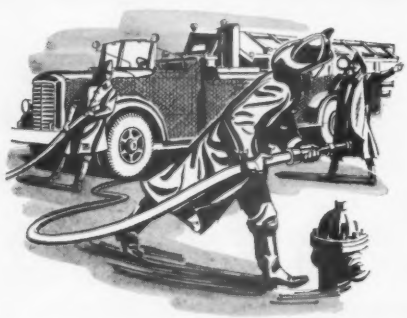
THE GENERAL TIRE & RUBBER COMPANY
Chemical Division, Akron, Ohio

Chemical Division GENERAL
THE GENERAL TIRE & RUBBER CO.
GEN-TAC

FORTISAN* 36 RAYON FIBER
makes these products STRONGER



V-BELTS. These vital power transmitters gain extra life when reinforced with Celanese FORTISAN-36. After extra long wear stretch is negligible. It won't expand or contract under normal V-Belt operating conditions so as to affect the belt's efficiency. This is because it's dimensionally stable. FORTISAN-36 is far stronger than conventional fibers, imparts higher tensile strength. That's why V-belts with FORTISAN-36 are now being used as original equipment on automatic washers, power mowers, trucks, passenger cars and farm tractors.



HIGH-PRESSURE FIRE HOSE. Used as filler cord in interior and exterior jackets of high-pressure fire hose, FORTISAN-36 pays off in a lighter but stronger hose that's more flexible, easier to handle and rack, and more heat-resistant. Also, it saves space because it folds tighter. FORTISAN-36 saves money in processing since it need not be heat-stretched.

HIGH-PRESSURE HOSE. High tensile strength, remarkable stretch-resistance and nearly perfect dimensional stability make FORTISAN-36 first choice for many types of high pressure hose. It produces a hose that's lighter, safer, more flexible and capable of taking extreme pressures easily. Hose of FORTISAN-36 appear likely to do a better job in aircraft controls, hydraulic presses, power feeds, trucks, greasing tools, road-building equipment.

FORTISAN-36 IS GOING PLACES! Besides these applications, this new Celanese high-tenacity, heavy-duty rayon of saponified acetate has practical application for truck tires, plastic laminates, filters, paper reinforcement, tarpaulins and webbing. Let us show you how it can improve your product. Write for booklet TD20A to Celanese Corporation of America, Industrial Sales Dept., Textile Division, Charlotte, N. C. Branch offices: 180 Madison Ave., N. Y. 16; Pilgrim Sq. Building, 9 Overwood Rd. at W. Market St., Akron 13, Ohio (Tel.: TE 6-2392). *Reg. U.S. Pat. Off.

Celanese

FIBERS FOR INDUSTRY

FORTISAN* RAYON · FORTISAN*-36 RAYON · ARNEL* TRIACETATE · ACETATE · VISCOSE-RAYON

We Proudly Present

THE NEWEST NAME IN SYNTHETIC RUBBER

FR-S

(FIRESTONE RUBBER-SYNTHETIC)

Made Only By

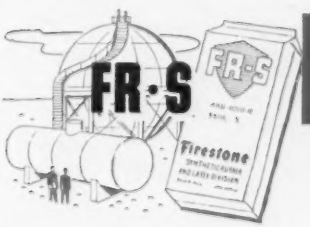
Firestone

The World's Largest Rubber Producer

A new era is here—and with it comes a new name for a greatly improved rubber! More than just a new name, FR-S is Firestone's new HIGH STANDARD of synthetic rubber . . . already tested and proved . . . and now in large scale use in Firestone's own manufacturing operations.

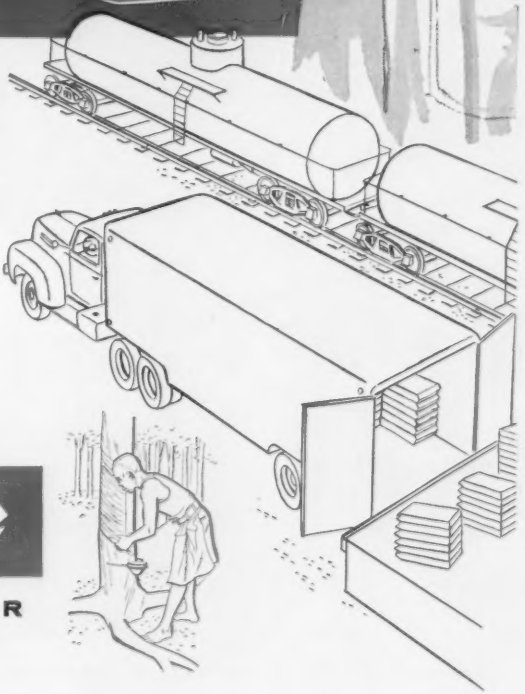
During the past year, every phase of Firestone's synthetic rubber manufacturing has been modernized. Raw materials must meet new, HIGHER STANDARDS. New, improved techniques; new measuring devices, and scientific methods of control have been added as plant capacity has been expanded.

FR-S is available in latex or dry rubber . . . in drums or tank car . . . bales or carload quantities. A Firestone Technical man will be glad to give you further information on FR-S and its applications. Phone or write Firestone, Synthetic Rubber and Latex Division, Akron, Ohio.



Firestone

BEST IN RUBBER



Fabric quality stays high, mile after mile

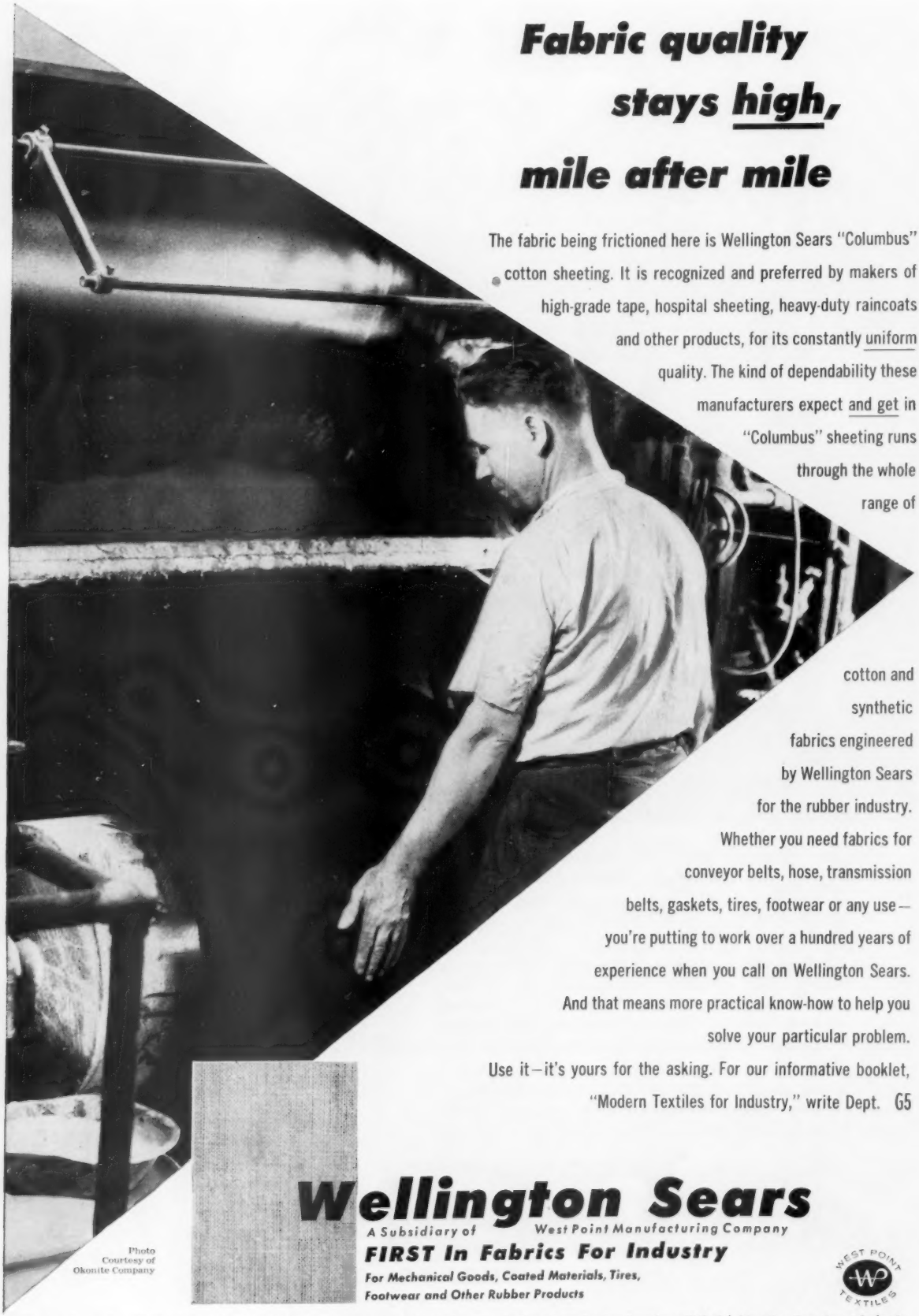


Photo Courtesy of Okonite Company

The fabric being frictioned here is Wellington Sears "Columbus" cotton sheeting. It is recognized and preferred by makers of high-grade tape, hospital sheeting, heavy-duty raincoats and other products, for its constantly uniform quality. The kind of dependability these manufacturers expect and get in "Columbus" sheeting runs through the whole range of cotton and synthetic fabrics engineered by Wellington Sears for the rubber industry.

Whether you need fabrics for conveyor belts, hose, transmission belts, gaskets, tires, footwear or any use—you're putting to work over a hundred years of experience when you call on Wellington Sears. And that means more practical know-how to help you solve your particular problem.

Use it—it's yours for the asking. For our informative booklet, "Modern Textiles for Industry," write Dept. G5

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Growth and expansion have a way of being contagious. Look for more things to benefit industry from Goodrich-Gulf.

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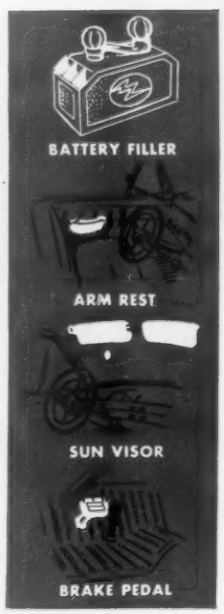
If your product requires a soft plastic coating or a molded part you should consider the use of vinyl plastisols.



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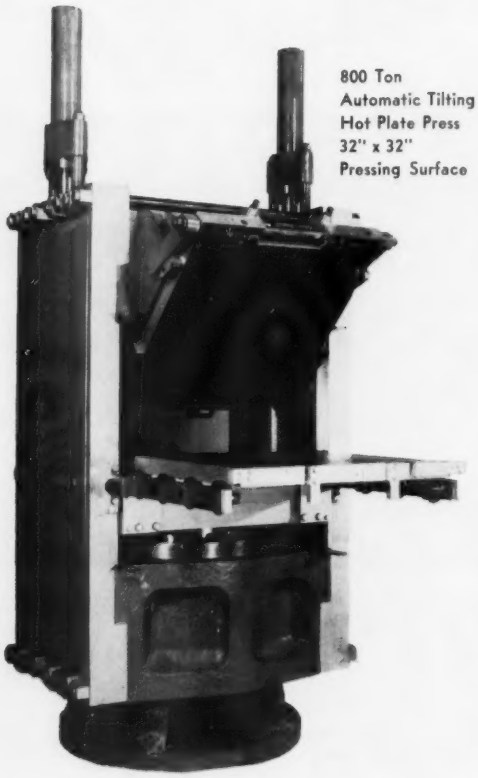

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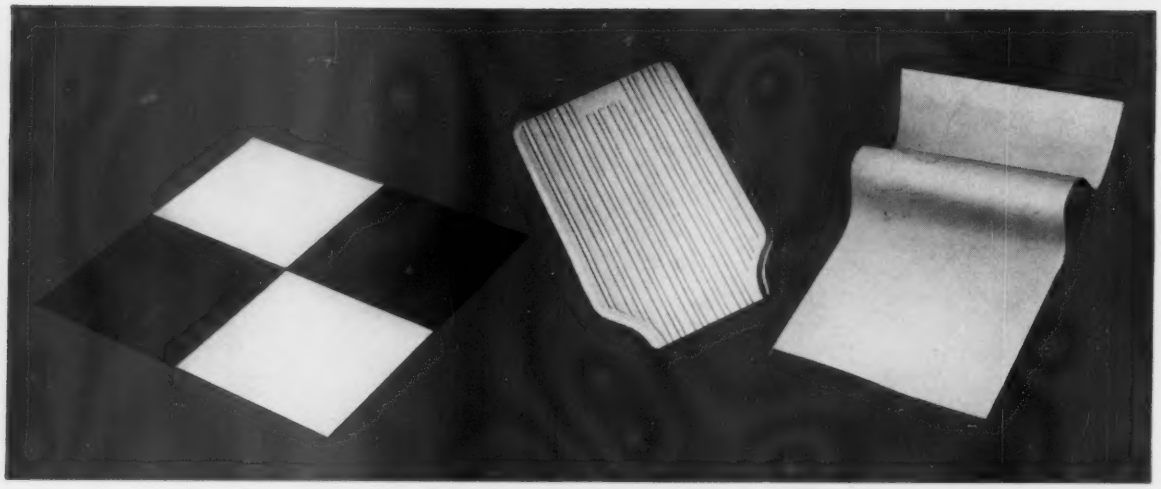
QUALITY Glidden PRODUCTS



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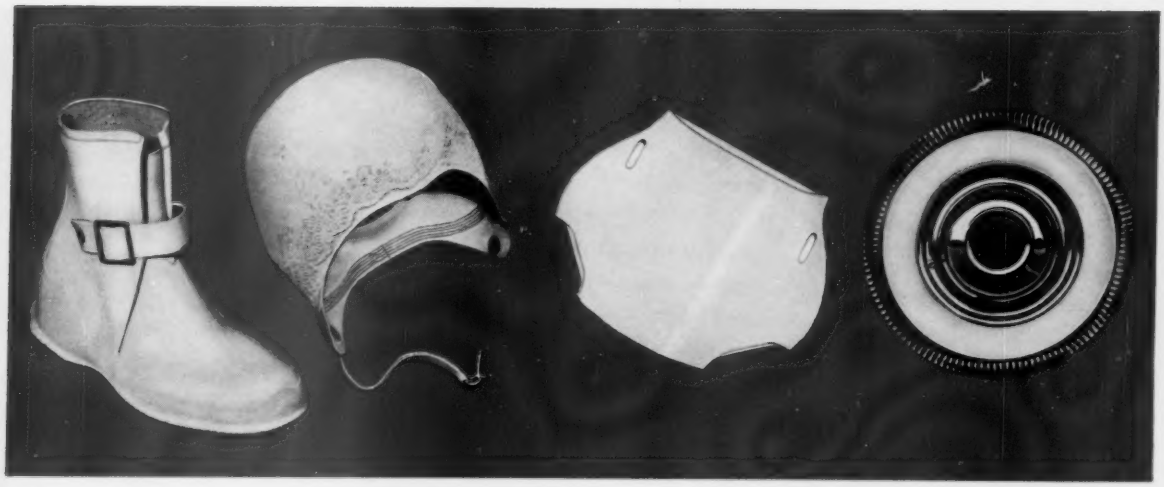
TITANIUM DIOXIDE



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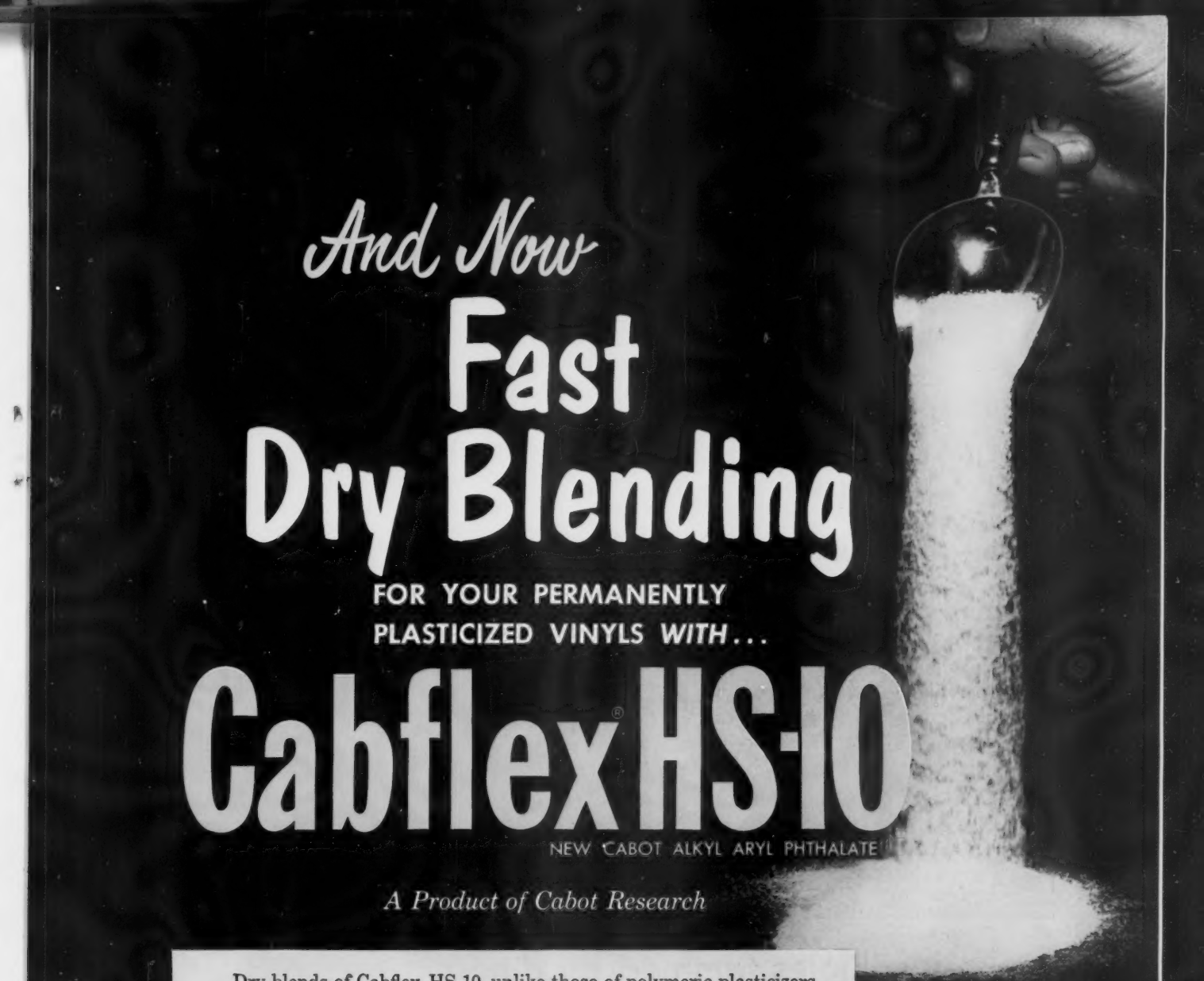

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NEW CABOT ALKYL ARYL PHTHALATE

A Product of Cabot Research

Dry blends of Cabflex HS-10, unlike those of polymeric plasticizers, are made quickly and easily, resulting in a free-flowing powder. Cabflex HS-10 is a unique low volatility phthalate plasticizer with amazing stability and permanence.

PLASTICIZER USED	HS-10	TYPICAL POLYMERIC PLASTICIZER
Viscosity of Plasticizer @ 20°C.	378 Cps.	3380 Cps.
Mixing Time	12 minutes	34 minutes
Condition of Powder Mix	Dry, Free Flowing	Non-Free Flowing
Color	White	Light Tan
PROPERTIES OF PLASTIC		
Volatility @ 90°C.—Weight Loss %[1]	0.99	0.95
Water Extraction @ 85°C.—Weight Loss %[2]	1.9	5.6
Soapy Water Extraction—Weight Loss %[3]	2.2	4.4
Oil Extraction—Weight Loss %[4]	1.2	1.1
Migration into Lacquer	Nil	Nil

(1) ASTM-DI203-52T
(2) Method of E. F. Schulz
(3) Immersed 24 hours @ 60°C. in 1% Ivory Soap Solution
(4) Immersed 10 days in Atreol #9 @ 23°C.

CHECK THESE ADVANTAGES OF CABFLEX HS-10:

- Volatility ½ that of di-iso-decyl phthalate
- Requires no antioxidant
- Outstanding insulation resistance in electrical vinyl compounds — 13,000 megohms/1000 ft. @ 15.6°C.
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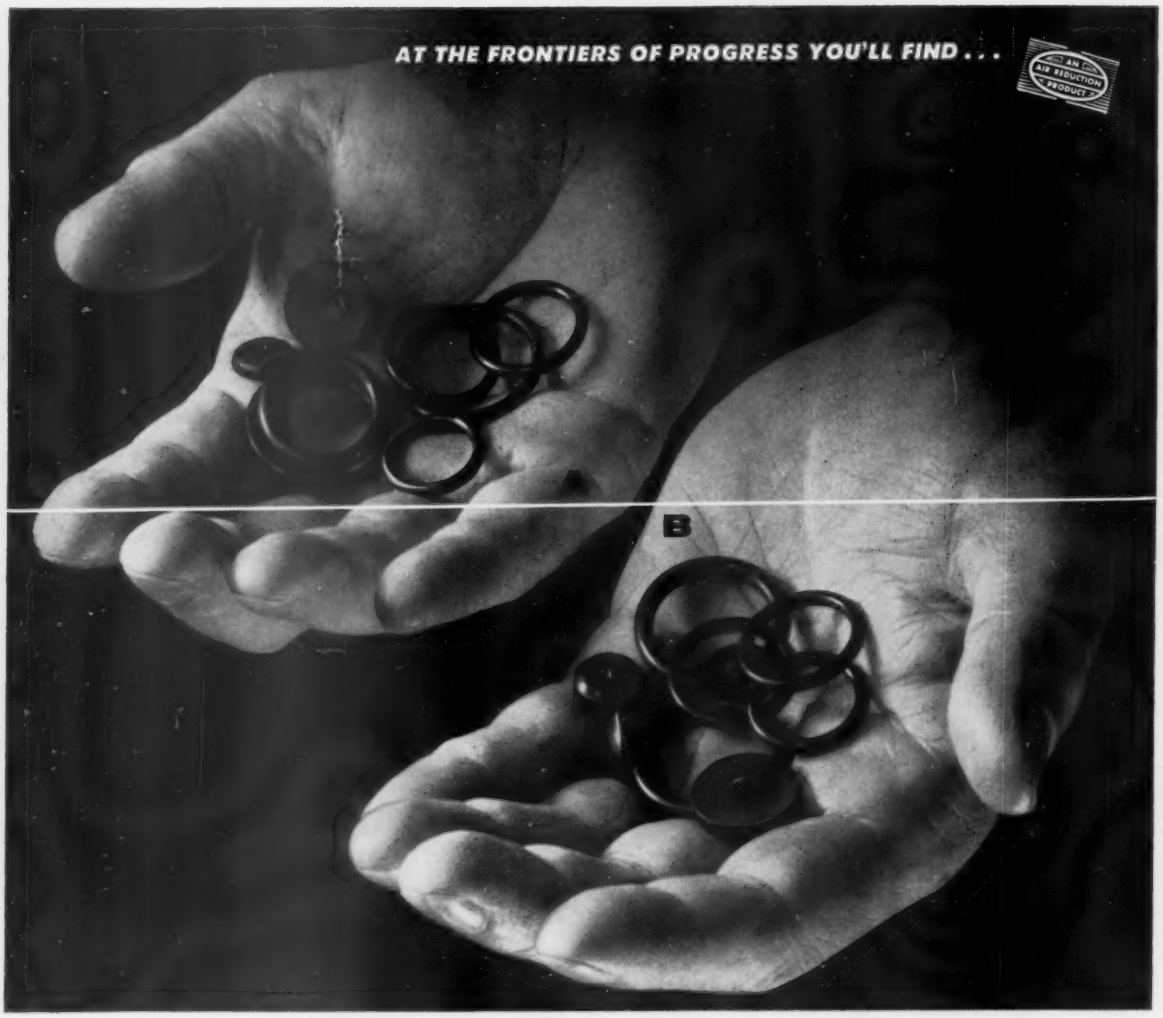

both samples trimmed by different methods . . . which one was finished 50 times faster?

It took 50 man hours to trim six thousand "Sample A" rubber fittings by hand. Yet it took one man only 1 hour to deflash the same number of "Sample B" fittings with a Pureco CO_2 rubber tumbler!

Pureco is ready to give you an on-the-spot demonstration to show you how a "frozen" rubber tumbling technique can knock deflashing costs cold.

A tumbler will be actually installed in your plant. Use it to tumble a variety of rubber fittings. See how you obtain better results, lower labor costs, fewer rejects and get gentler handling of delicate parts.

Or, if you prefer, ask your Pureco man to take a supply of "problem" parts to Pureco experts. Receive a confidential laboratory report on the tumbling method and the CO_2 form which will best serve you — CO_2 crushed "DRY-ICE" blocks, liquid CO_2 for better temperature control or CO_2 "snow" for tumbling close-tolerance precision parts.

Call in your Pureco man now. There's no cost or obligation.

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Nevastain A is an excellent non-staining, non-discoloring antioxidant with very low volatility and good stability. Synthetic and natural rubber compounds using Nevastain A have superior physical characteristics over those containing competitive non-staining antioxidants. Among its virtues are that it does not retard vulcanization, does not have an accelerating effect and does not bloom uncured or cured stock when used in normal quantities. This new product is being produced on a plant scale and is readily available and attractively priced. Use the coupon below to write for Technical Service Report No. 45.

Neville Chemical Company, Pittsburgh 25, Pa.

Resins—Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Alkylated Phenol • **Oils**—Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents**—2-50 W Hi-Flash, Wire Enamel Thinners.

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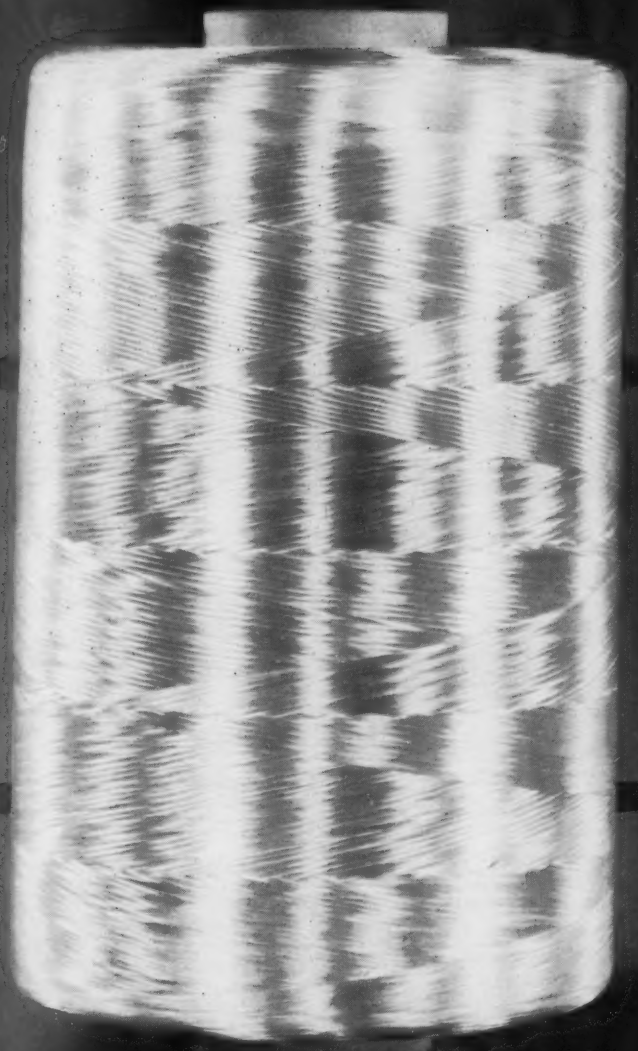

caprolan*

NYLON HEAVY YARNS

Allied Chemical's new Caprolan heavy yarns are of particular interest to makers of:

Heavy Duck • Industrial Slings • Fire Hose • Cords & Braids
Upholstery Fabrics • Webbings • Conveyor Belt Fabrics
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* TRADE-MARK

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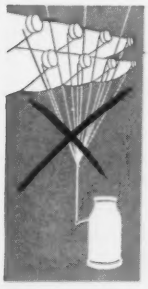
Nylon Heavy Yarns

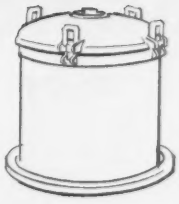
A Completely New Class of Durable Textile Yarns Available in 2,100, 2,500, 5,000 and 15,000 Denier

Mills report these advantages:



1. Cuts Plying Costs! Supplied in the total deniers you need, Caprolan nylon heavy yarns are engineered to your specifications without plies. No need to inventory costly finer deniers. Heavy yarns with nominal twist are supplied on knotless 10-pound parallel nonreturnable tubes.

2. Cuts Heat-Setting Cycles! Another money-saving advantage of these heavy yarns is that heat-setting cycles can be materially shortened because of Caprolan's workability with heat.



3. Minimizes Dyeing Problems! Heavy nylon constructions are much easier to dye when Caprolan heavy yarns are used. Allied's new fiber has a remarkable affinity for all classes of dyestuffs.

Other Heavy Yarns Can Be Engineered to Your Specifications In a Range from 2,000 to 50,000 Denier!

Now, from Allied Chemical—an important new tool for the textile industry—nylon heavy yarns engineered to your specifications! This completely new class of durable textile yarns eliminates need to ply multiple ends of finer deniers to achieve a higher total effect.

Caprolan heavy yarns are versatile, too. Whether you make duck, webbings, carpet, upholstery or any other type of heavy nylon fabric these heavy yarns will find a place in your mill. They are especially effective where toughness and high impact strength are important considerations.

These nylon heavy yarns are made exclusively by Allied Chemical. In addition to all of the known qualities of nylon, Caprolan heavy yarns offer such plus values as affinity for all classes of dyestuffs, *deep* dyeing and uniform level shades.

These new heavy yarns already are in commercial use in important mills and evaluation programs are under way in many others. If you would like more information, technical assistance, or would like to evaluate Caprolan heavy yarns in your own mill, write:

Fiber Sales and Service

NATIONAL ANILINE DIVISION

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Branch Offices—Jefferson Standard Building, Greensboro, N.C., 200-204 S. Front St., Philadelphia 6, Pa., 15 Westminster St., Providence 3, R.I.

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Here's the first silicone rubber tire ever produced. Built in cooperation with Dow Corning by a group of rubber research and development engineers, this tire was designed to explore another area of potential usefulness for Silastic.* Such studies become more urgent as design engineers find an increasing need for rubbery materials that retain good physical and dielectric properties in service at temperatures above 200 F. Looking toward future developments in tires, mechanical rubber parts or electrical insulating systems, you'll find that Dow Corning is your best source of silicone rubber research materials and technical assistance. We offer your research men sample quantities of the most complete line of silicone gums available — sulfur vulcanizing, peroxide vulcanizing and fluid types.

These Silastic PROPERTIES mean better products . . . *Low compression set without toxic additives. Serviceability at temperatures ranging from —100 F to 500 F. Maximum resistance to weathering, ozone, corona. Ideal dielectric properties. High tensile strength with silica fillers.*

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A Specialty Elastomer with Extra-Special Properties

HYPALON® 20

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No HYPALON product has ever been known to fail due to ozone attack. (See Reports 55-3, 55-5, BL-269.)

HEAT–

HYPALON products perform well at high temperatures. (See Reports 55-3, BL-262, BL-267, BL-306, BL-310.)

CORROSIVE CHEMICALS–

Exceptional resistance to acids and other strong oxidizing chemicals. (See Reports BL-258, BL-261, BL-267.)

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Weatherability of HYPALON products is excellent. Brilliant colors stay bright. (See Reports BL-251, BL-274, BL-297, 55-5.)

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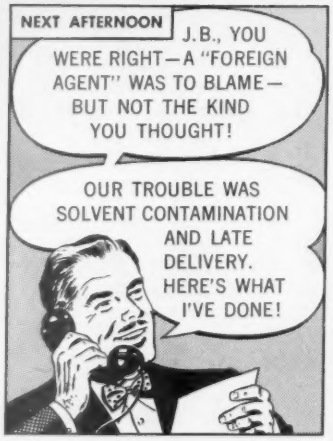
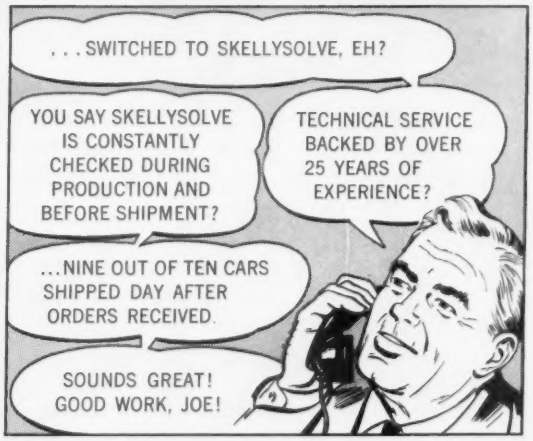
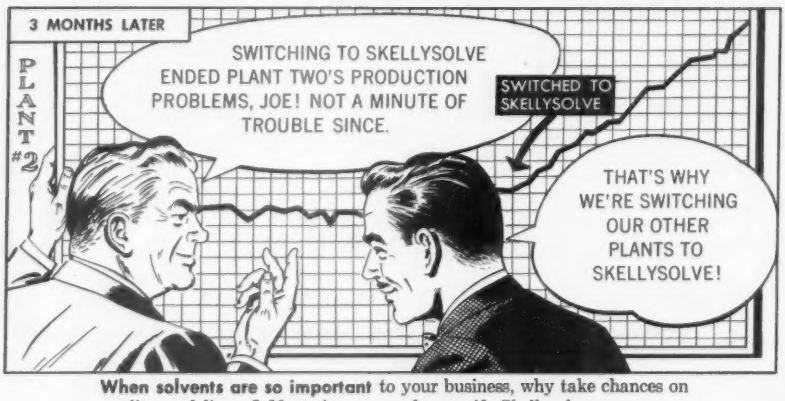
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

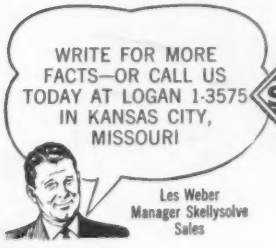
THE CASE OF THE
FOILED FOREIGN AGENT
JOE, I KNOW THIS SOUNDS RIDICULOUS BUT PRODUCTION LOSS IN PLANT TWO IS SO HIGH IT SEEMS LIKE SABOTAGE!
I'LL RUN OUT THERE AND LOOK INTO IT MYSELF, J.B.!


NEXT AFTERNOON
J.B., YOU WERE RIGHT—A "FOREIGN AGENT" WAS TO BLAME—BUT NOT THE KIND YOU THOUGHT!
OUR TROUBLE WAS SOLVENT CONTAMINATION AND LATE DELIVERY. HERE'S WHAT I'VE DONE!


...SWITCHED TO SKELLYSOLVE, EH?
YOU SAY SKELLYSOLVE IS CONSTANTLY CHECKED DURING PRODUCTION AND BEFORE SHIPMENT?
TECHNICAL SERVICE BACKED BY OVER 25 YEARS OF EXPERIENCE?
...NINE OUT OF TEN CARS SHIPPED DAY AFTER ORDERS RECEIVED.
SOUNDS GREAT! GOOD WORK, JOE!


3 MONTHS LATER
PLANT #2
SWITCHING TO SKELLYSOLVE ENDED PLANT TWO'S PRODUCTION PROBLEMS, JOE! NOT A MINUTE OF TROUBLE SINCE.
SWITCHED TO SKELLYSOLVE
THAT'S WHY WE'RE SWITCHING OUR OTHER PLANTS TO SKELLYSOLVE!

When solvents are so important to your business, why take chances on quality or delivery? Next time you order specify Skellysolve.



SKELLY **Skellysolve**

SKELLY OIL COMPANY
Industrial Division
605 West 47th Street, Kansas City 41, Mo.

Skellysolve for Rubber and Related Industries

APPLICATIONS

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound. Closed cup flash point about -25°F.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13°F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about -16°F.

SKELLYSOLVE-L. For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12°F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about -25°F.

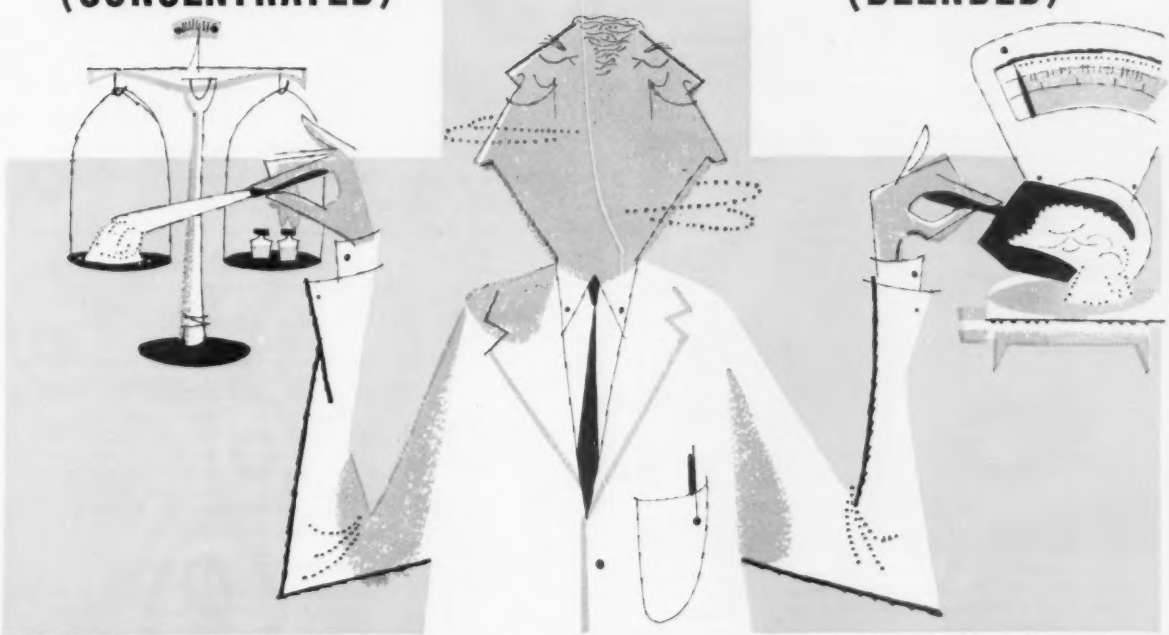
Ask about our new
Skelly Petroleum Insoluble Grease.

TAKE YOUR CHOICE!

Efficient low-temperature peptizer now available in two forms...

PEPTON® 65
PLASTICIZER
(CONCENTRATED)

PEPTON® 65-B
PLASTICIZER
(BLENDED)



You can achieve reductions of as much as 30% in your milling cycles — and get good plasticity in natural rubber —with small quantities of PEPTON 65, Cyanamid's newest concentrated plasticizer.

Or if you prefer it in blended form, Cyanamid offers PEPTON 65-B. This blend features improved resistance to caking, better dispersion and less tendency to dust. Both are available in semi-commercial quantities, and samples are offered for trial evaluation through your Cyanamid representative.

ANOTHER CYANAMID QUALITY PRODUCT

CYANAMID

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PROCEEDINGS of the Third Rubber Technology Conference

Copies of all the papers presented at the Conference held in London on June 22-25, 1954, under the auspices of the Institution of the Rubber Industry, are presented in this volume, together with the discussions on each paper. The papers are world-wide in character and represent the latest thinking in the science and general technology of rubber. This informative volume is a **must** for all who wish to keep abreast of developments in the field.

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Properties of Natural Rubber Latex

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Improved Rubbers by the Enzymatic Deproteinization of Skim Latex. *J. E. Morris.*
Stability of Ammoniated Latex and Soap-Stabilized Emulsions in the Presence of Complex Zinc Salts. *T. S. McRoberts.*
Variability of Hevea Latex. *W. L. Resing.*
Zinc Oxide Testing of Latex. *E. W. Madge, H. M. Collier,* and *J. L. M. Newnham.*
Hevea Latex: Its Structure and Viscosity. *G. Verhaar.*
Contribution to the Study of Mineral Elements in Field Latex. *E. R. Beaufils.*
Rubber Peptized on the Plantation. *G. Giger, J. Lemee* and *M. Liponski.*

Production and Evaluation of Synthetic Rubber

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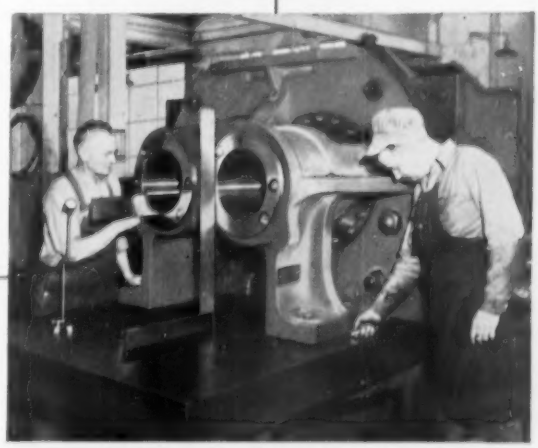

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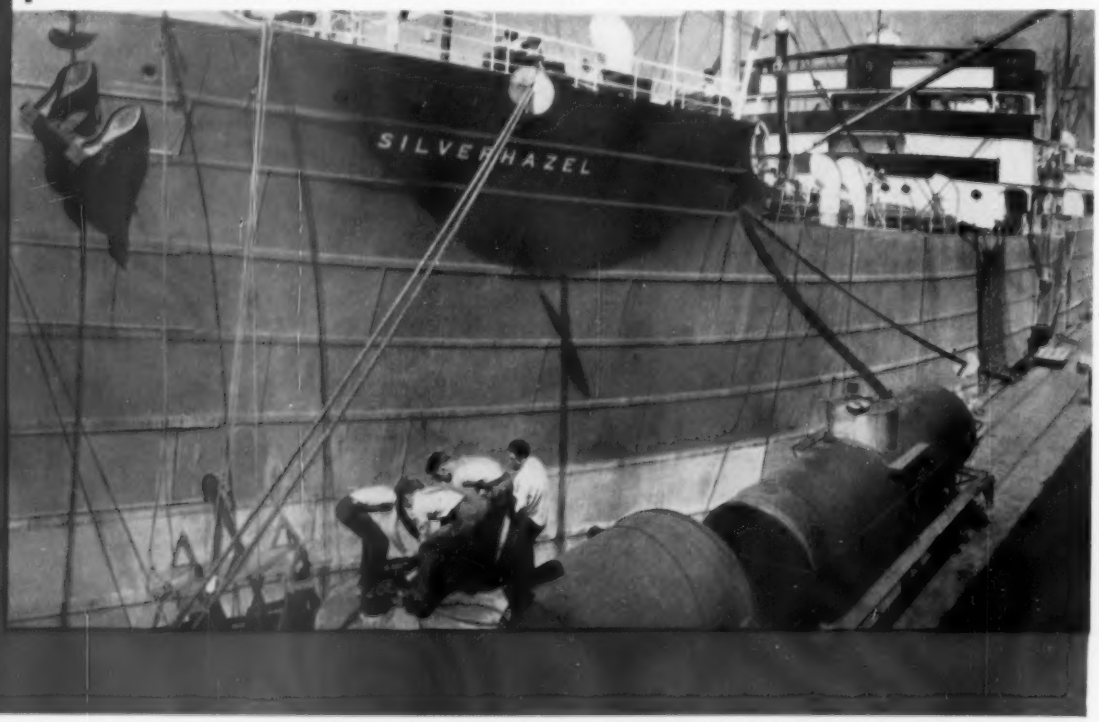

3 To prepare natural latex for economical shipping from the Far East, a large percentage of its water content is removed by creaming (skimming) or centrifuging. The centrifuges used are similar to cream separators in appearance and operation.

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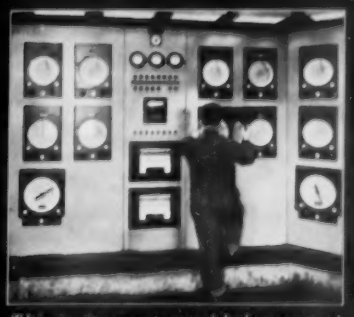

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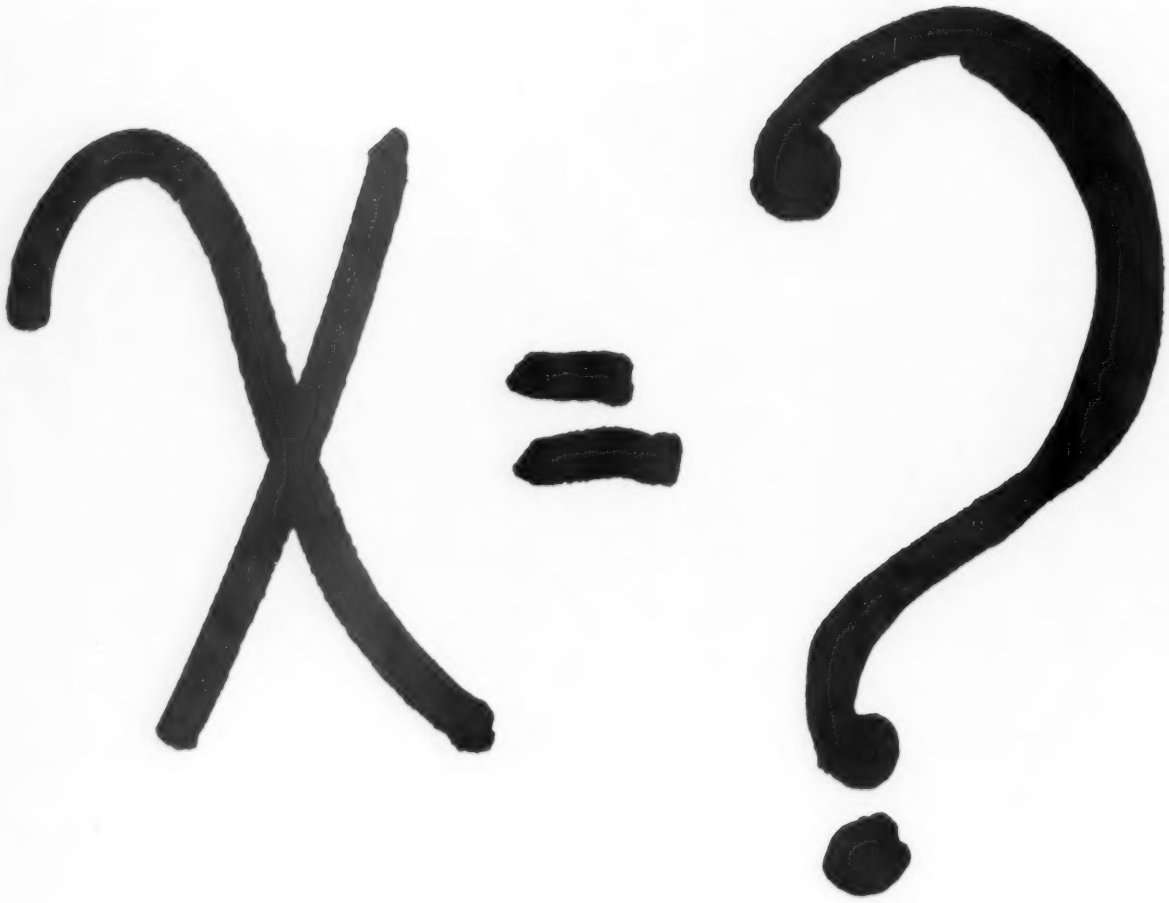

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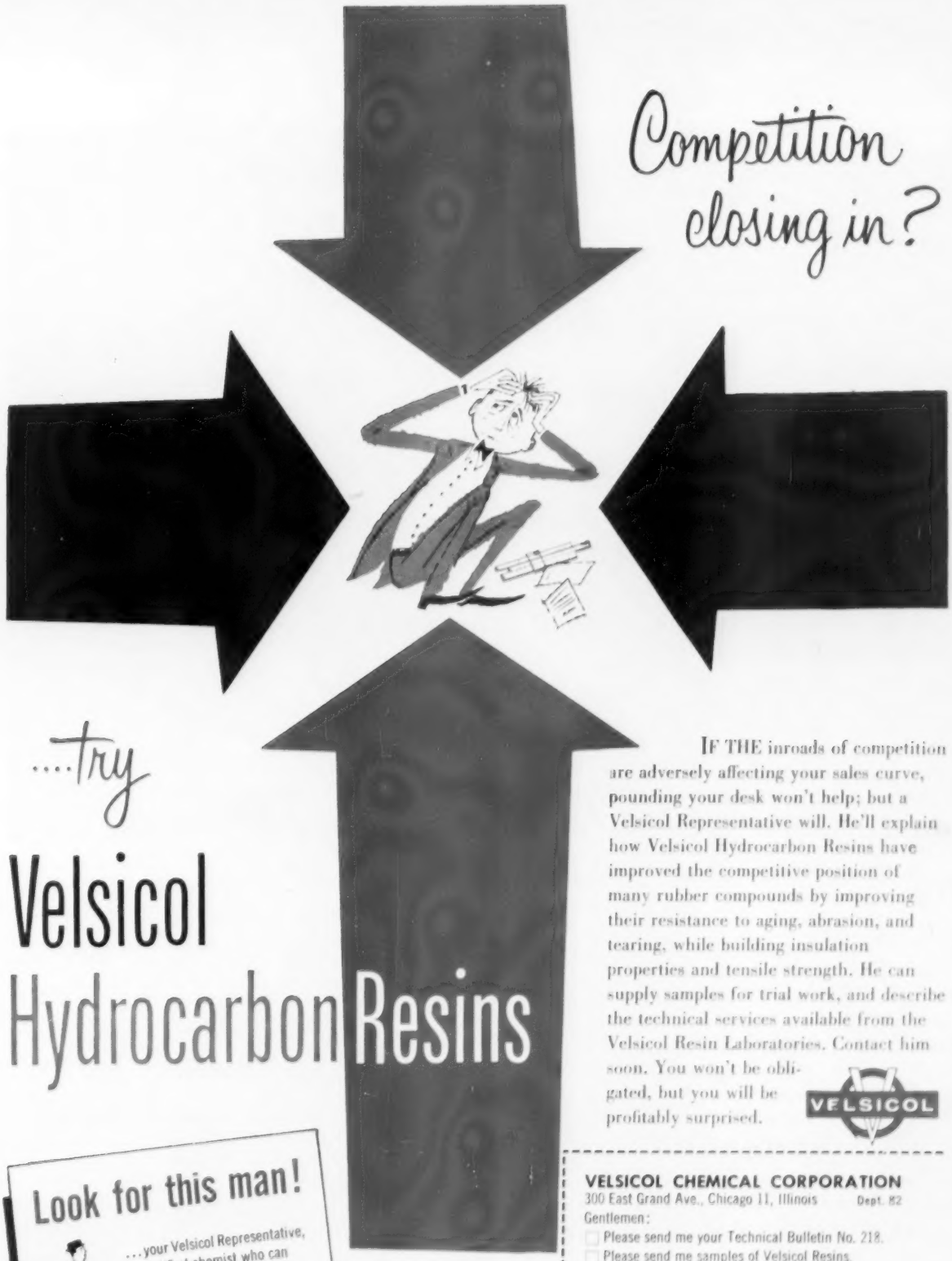

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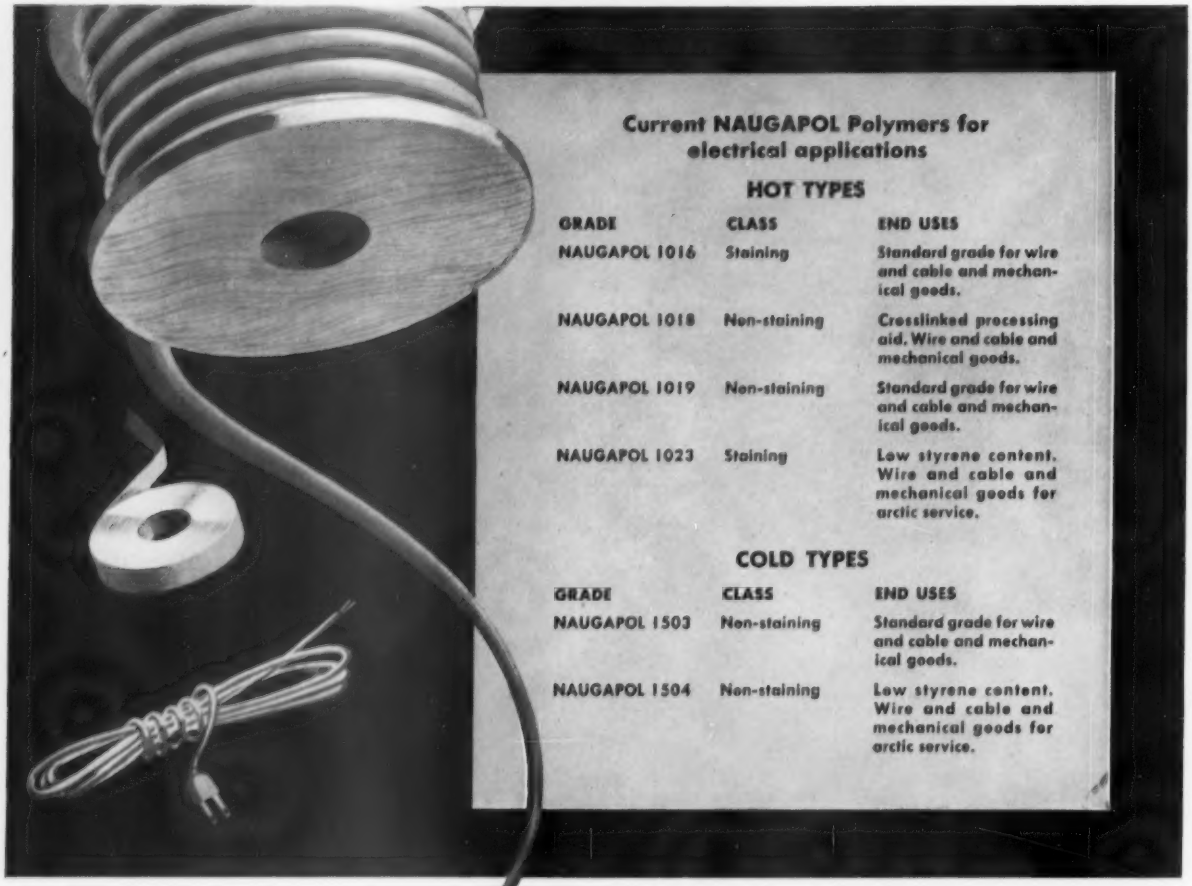

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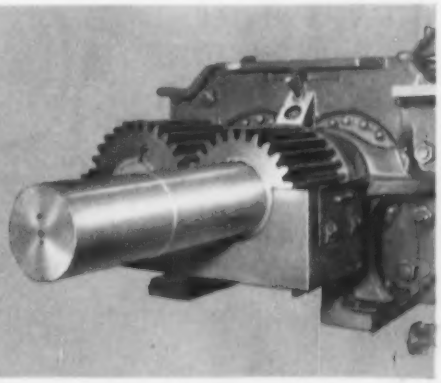

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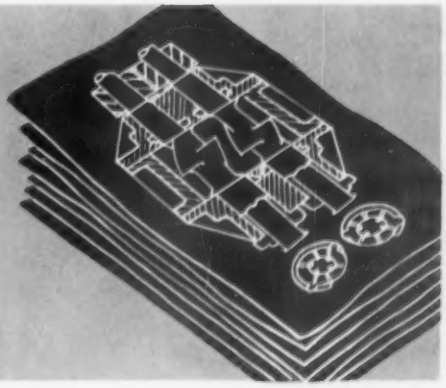

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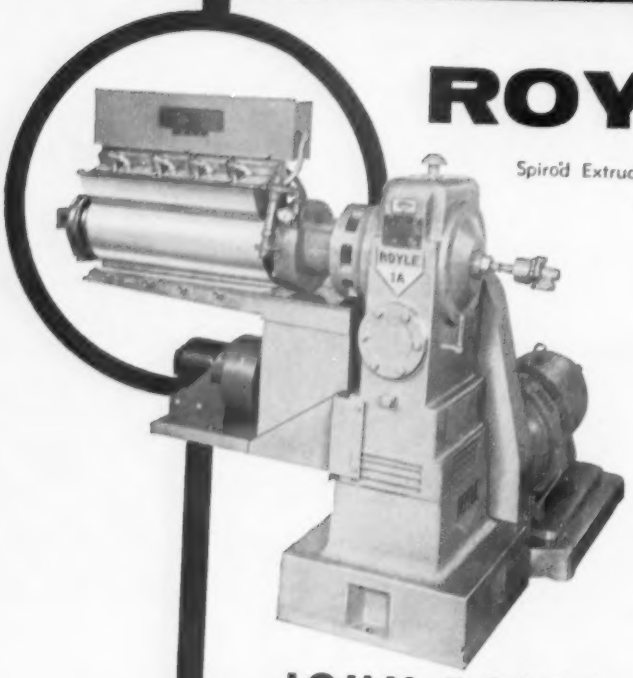

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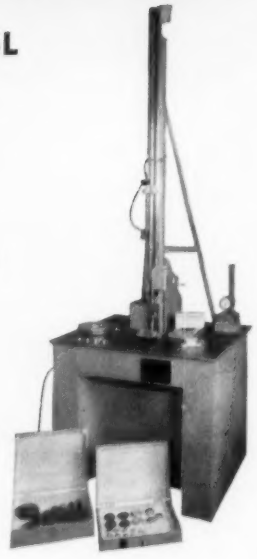

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CALCIUM NITRATE, Technical Flake — *Typical analysis*

Assay (as $Ca(NO_3)_2$)	71.8 %
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Insoluble and NH_4OH Ppt.	0.03 %
Ammonium Nitrate (NH_4NO_3)	0.1 %
Magnesium & Alkalies (as NO_3)	0.4 %
Iron (Fe)	0.0003%
Copper (Cu)	0.0004%
Manganese (Mn)	0.001 %
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ZINC NITRATE, Technical Flake — *Typical analysis*

Assay (as $Zn(NO_3)_2$)	74.2 %
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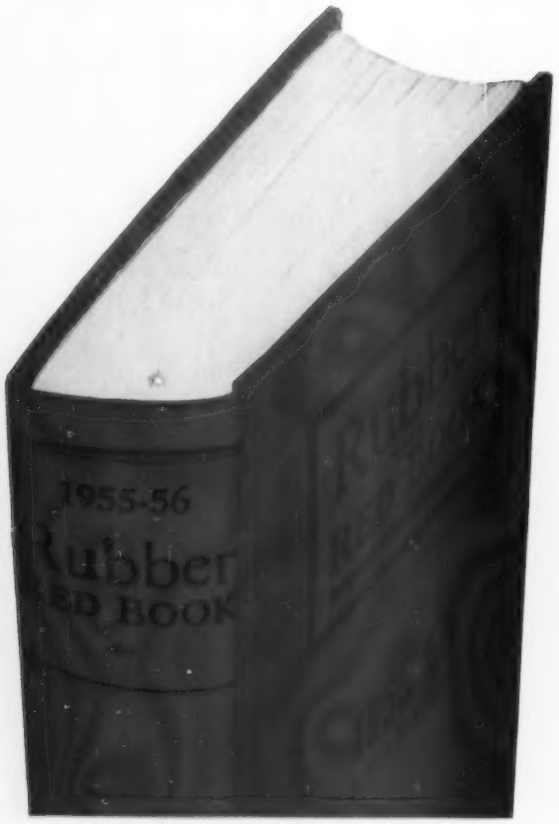

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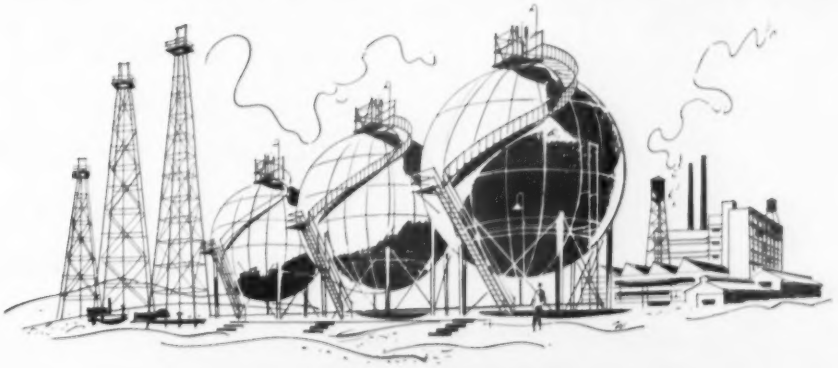

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*SYNPOL 1061	Non-Staining
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*SYNPOL 1551	Non-Staining
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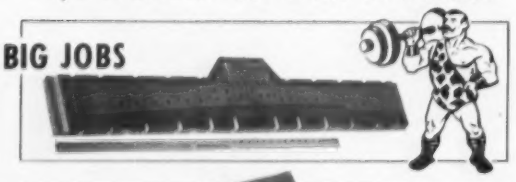

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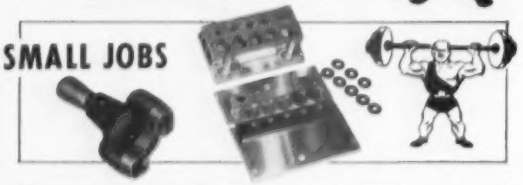

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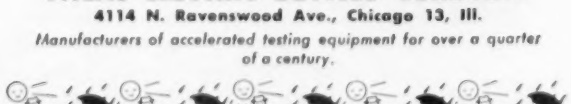

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	DOP	DIOP	DDP
Density 20/4	0.983	0.983	0.963
EMC* at 1,600 psi	50.3	51.4	53.7

**Equivalent Modulus Concentration (phr)*

INDOIL plastics evaluation laboratory checks quality of INDOIL Alcohols by testing finished product. Here operator measures elongation of plasticized vinyl strip to determine Equivalent Modulus Concentration of plasticizer.

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Ratio $\frac{\text{Plasticizer phr}}{\text{DOP phr}}$		
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DOP	1.000	1.000
DIOP	1.022	1.019
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Contact your supplier – Ask your plasticizer manufacturer for samples of DIOP, DDP and other esters made with INDOIL Oxo Alcohols. INDOIL Chemical Company does not manufacture esters

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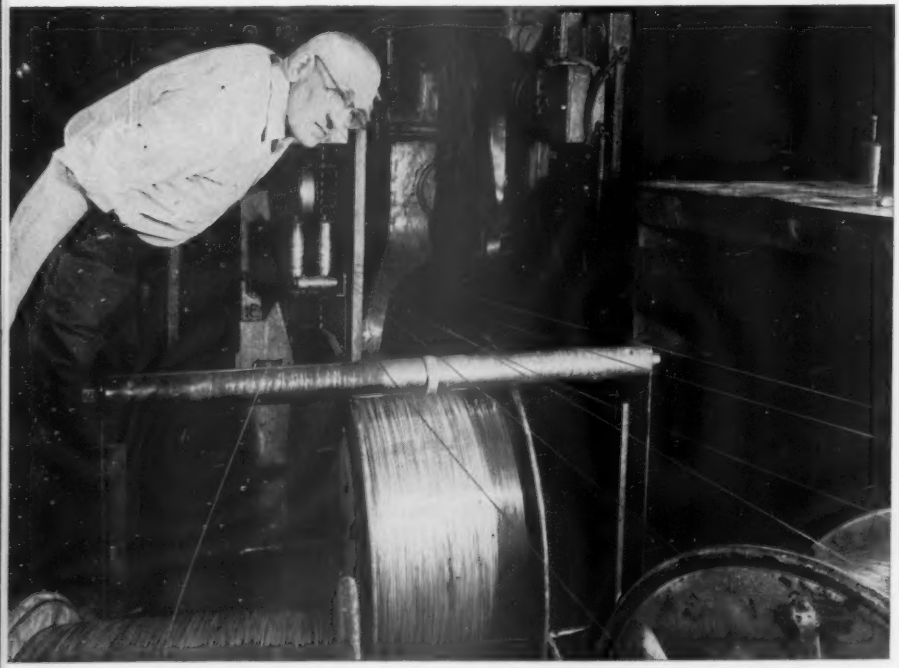

Smooth and straight, parallel tire bead wires uncoil into a bead building machine where they are encased in synthetic compound that adheres to the bright bronze-plated surfaces.

Layers of wire, insulated by synthetic compound to prevent friction, are encased in a "flipper." The flipper is built into the green carcass to become an integral part of the tire.

Steel

While driving your automobile down some peaceful country highway, have you ever struck a chuck-hole so hard you thought it might rip the tires off the wheels?

The fact is that few tires escape these occurrences at sometime or another while they are in service on your car.

Truck tires, carrying heavier loads, take rougher punishment. The tires on earth-moving equipment stand up under it continually in normal day-to-day operations. So tires are built for rugged use, and then some.

Take the tire beads of steel wire that anchor the tire to the rim, for example. It is a special wire.

As produced by Johnson Steel and Wire Company for all the blue-chip tire manufacturers, it meets exacting requirements for high tensile strength, twisting strength, elongation, and has special surface finish that provides adhesion to synthetic rubber compound in the tire.

Without steel wire, the revolutionary new tubeless tire would be impossible. In the old-style tire with tube, the tube contains the air pressure in the tire. In the tubeless tire, the tire walls must be anchored to the rim of the wheel so tightly that the air pressure is sealed in without a tube. Even under tremendous impact the air-tight seal will not be broken.

Look at the way Johnson's tire bead

Revolutionary new tubeless tires are anchored to wheel rims by steel wires of tremendous strength. Tire beads such as those for The Goodyear Tire & Rubber Company's tubeless auto tire, for example, contain 32 individual wires providing a total bead strength of 4½ tons.

Death-defying stunt drivers batter tubeless tires mercilessly. Steel bead wires absorb the impact, hold the tires to the rim so tightly that sealed-in air pressure cannot leak even under the most rugged road shocks. Tests like these demonstrate dependability of tire bead wire.

Tendons For Tubeless Tires

wire is built into tubeless tires at The Goodyear Tire & Rubber Company, for instance. To begin with, the wire is about 1/32-of-an-inch in diameter, very accurately drawn to a tolerance of two thousandths of an inch—so small that a 750-pound reel of it contains 38 miles of wire.

Yet this wire has a breaking strength of 285 pounds. In the construction of a bead for the tubeless automobile tire, the bronze-plated wires from several reels feed parallel into a bead building machine. They are insulated with synthetic rubber compound that adheres to the surface finish and encases them, and emerge in the form of flat black tape.

The tapes containing several parallel wires are wound one on top of another and wrapped together in a "flipper" containing 16 wires. The flipper is then encased by the tire fabric, making it an integral part of the tire construction.

The conventional 6.70-15 tubeless tire for your automobile, then, contains a total of 32 wires in the beads on both sides of the tire. This gives you a total bead strength in each tire equal to four-and-one-half tons—more than twice the entire weight of your automobile.

The new tubeless truck tires making their debut offer truckers assurance of less road delay and less deadweight load.

The beads in a tubeless tire for a five-to-ten ton trailer truck, for example, contain a total of 196 wires in both sides of the tire. This gives each tire a total bead strength of 28 tons—more than equal to the entire weight of a heavily loaded truck.

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Rubber Age

Vol. 79, No. 2 MAY, 1956

Properties of GR-S as Affected by Antioxidants

By W. K. TAFT, JUNE DUKE, DOROTHY PREM and T. B. HARRISON

Government Laboratories, University of Akron, Akron, Ohio

Samples of 50 Mooney viscosity cold GR-S, differing only in antioxidant, were found to have rather wide differences in heat-, mill-, and Banbury-breakdown characteristics. The type of antioxidant influenced the amount and rate of polymer breakdown and also the tendency of the polymer to crosslink at higher temperatures.

Variations in the time of premixing samples containing the different antioxidants affected the physical properties of the vulcanizates differently. Tensile strength values of the various untreated stocks showed a significant spread, but differences caused by the antioxidants between the samples diminished as premixing time increased in both Banbury and mill mixing.

Analysis of corresponding changes in Mooney and dilute solution viscosity (DSV) indicated a significant correlation with molecular weight distribution, and substantiates that the ratio of the change in Mooney viscosity to change in DSV is a measure of the distribution and may be interpreted as indicating where the chain scission occurs.

Attempts to measure changes in polymer branching by means of the slopes of concentration or dilute solution viscosity versus concentration curves were unsuccessful insofar as correlation with viscosity and distribution changes or physical properties of the vulcanizates were concerned. Only with certain antioxidants and under certain conditions could polymer breakdown be related to physical properties, and it is felt that structural changes, such as branching, are involved in masking consistent correlation of the breakdown and distribution factors with physical properties.

PREVIOUS work *(1)* has shown that various antioxidants protect polymers differently with respect to changes in Mooney and dilute solution viscosity, and that they contribute, in varying degrees, to the polymer breakdown or condensation that occurs during heat treating. These differences in the antioxidants were observed with GR-S-1500 type polymers (prepared at 41°F.) of high and low Mooney viscosities and with oil-polymer masterbatches. Other investigations *(2)* of a high viscosity base polymer and masterbatches of the same polymer with oil, indicated that the ratio of the change in Mooney viscosity to the change in DSV, after heat or Banbury treatment of the polymer, reflected the molecular weight distribution; changes in the ratio could be interpreted as indicating approximately the point in the polymer chain where scission took place.

When using this interpretation regarding the changes in the ΔML-4/ΔDSV ratio, the antioxidants appeared to cause scission at different points in the polymer chain, thus affecting the molecular weight distribution of the treated polymers. There also seemed to be evidence that with any one antioxidant for any particular type of treatment, variation in the time of treatment caused scission at different points in the polymer chain. Also, the type of oil used was shown to affect the properties of the compounded stocks.

The ΔML-4/ΔDSV and molecular weight distributions were used to study further the effects of different antioxidants incorporated in GR-S-1500 of normal Mooney viscosity.

The work reported herein was done to obtain additional data to determine whether or not changes in Mooney viscosity and DSV correlated with the point of scission, and also whether correlation with stress-strain or elongation properties could be obtained with the aforementioned changes. Another objective was to evaluate various types of antioxidants as they affect

TABLE I — TEST RECIPE

	Parts
Polymer	100.00
Black (EPC)	40.00
Zinc oxide	5.00
Sulfur	2.00
2,2'-di-benzolthiazyl disulfide	2.375
Stearic acid	0.75
	150.125

the polymers when heat softened, milled or treated in a Banbury, and the effect of these treatments on the properties of the vulcanizates.

Procedure

A gel-free GR-S-1500 type latex was prepared at 41°F. from a 71/29 butadiene-styrene charge in a 500-gallon reactor according to an iron-pyrophosphate redox formula. The charge was polymerized to a conversion of 60.1% in 10.0 hours. The latex was divided into nine portions and 1.25% of the following antioxidants based on the solids was added to separate portions of the latex: phenyl-2-naphthylamine (PBNA), acetone-diphenylamine reaction product (BLE), mixed mono- and diheptyl diphenylamines (Stalite), tris nonyl phenyl phosphite (Polygard), substituted alkylated phenols mixture (Wingstay-S), beta-conidendrol, and 2,2'-methylene-bis-4-methyl-6-t-butyl phenol (Antioxidant 2246). One portion of the latex was coagulated without any added antioxidant and was dried in a vacuum oven at about 78°F. The latices containing the antioxidants were coagulated with salt and acid and the crumb was dried in a forced-air oven at 140°F.

Portions of the dried polymer were extruded through a shoestring die in a No. 2 Royle extruder and were heat aged in a forced-air oven for various periods up to 48 hours at 140°F. or up to 24 hours at 200°F. Other portions of the raw polymers were milled at about 250°F. for 15, 20, and 30 minutes or masticated at about 310°F. in a size B Banbury mixer for 5, 10, and 15 minutes with loadings of 1200 grams of polymer. Gel content, dilute solution viscosity, and molecular weight distribution measurements were made for each sample. In the case of the samples heat aged at 140°F., intermediate molecular weight distribution determinations were not made when there was no appreciable difference between the original and 48-hour aged samples.

Vulcanizates of the original polymers and of those milled for the three periods and Banbury treated for the three periods were prepared by milling according to the recipe shown in Table I. Stress-strain and constant-load elongation data were obtained from the vulcanizates.

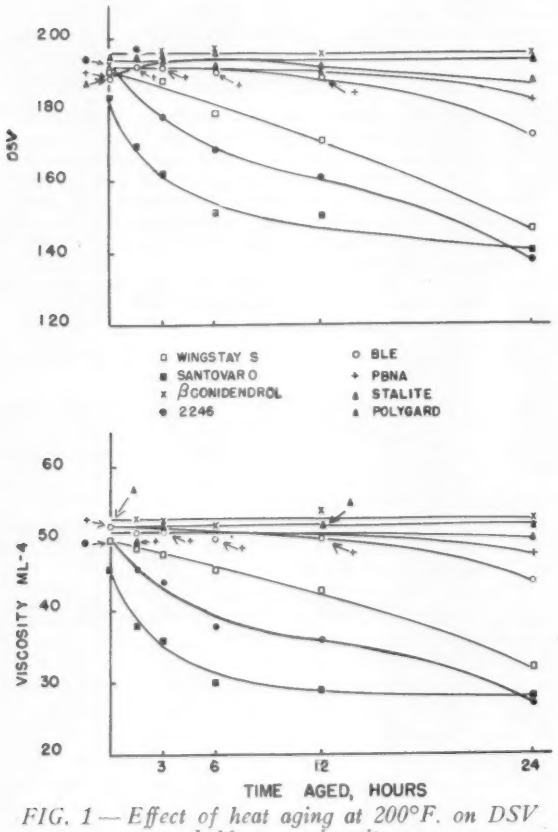

FIG. 1 — Effect of heat aging at 200°F. on DSV and Mooney viscosity.

Results and Discussion

The changes in dilute solution viscosity and Mooney viscosity which occurred during heat aging of the raw polymers at 140°F. are shown in Table II. Only two of the polymers, those stabilized with Santovar O and 2246, showed a significant change after 48 hours heating at 140°F. The unheated (or "O" aged) samples indicate that only the polymer containing Santovar O was softened significantly during drying.

However, after aging for 24 hours at 200°F., as shown in Figure 1, breakdown had occurred in varying degrees in all of the polymers except the ones stabilized

TABLE II — POLYMERS HEAT AGED AT 140°F.

Antioxidant	Aging Time (hr.)	Viscosity (ML-4)	Gel (%)	DSV
PBNA	0	52	1	1.92
	24	52	1	1.92
	48	52	0	1.92
BLE	0	52	0	1.89
	24	52	2	1.92
	48	52	0	1.89
Stalite	0	52	0	1.90
	24	52	1	1.93
	48	52	0	1.92
Polygard	0	52	1	1.95
	24	53	1	1.93
	48	52	2	1.93
Wingstay-S	0	50	1	1.92
	24	52	0	1.92
	48	50	0	1.89
Santovar O	0	46	2	1.83
	24	40	0	1.69
	48	37	0	1.62
B-conidendrol	0	52	1	1.93
	24	54	0	1.96
	48	54	0	1.93
2246	0	50	1	1.91
	24	50	0	1.85
	48	48	0	1.83

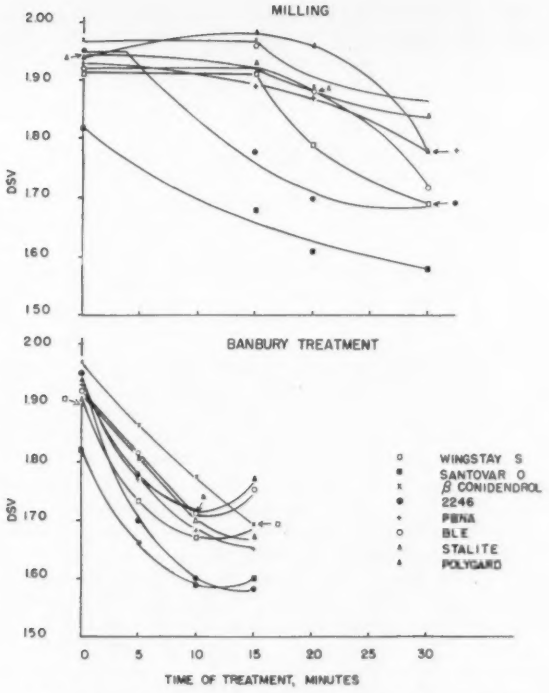

FIG. 2 — Effect of treatment on dilute solution viscosity.

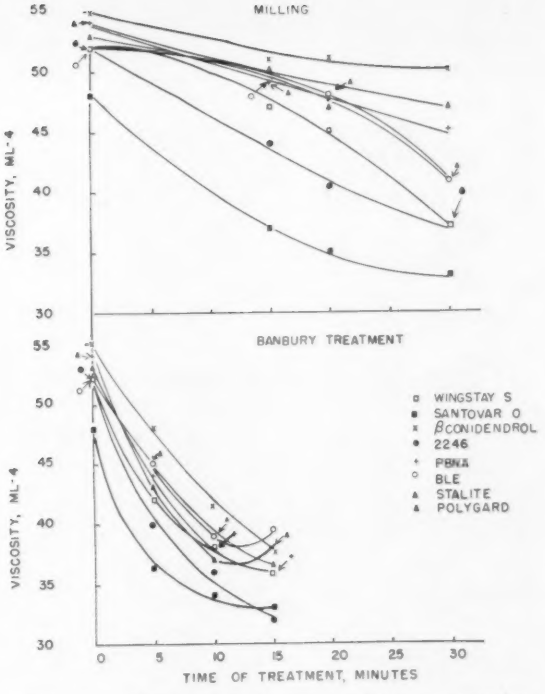

FIG. 3 — Effect of treatment on Mooney viscosity.

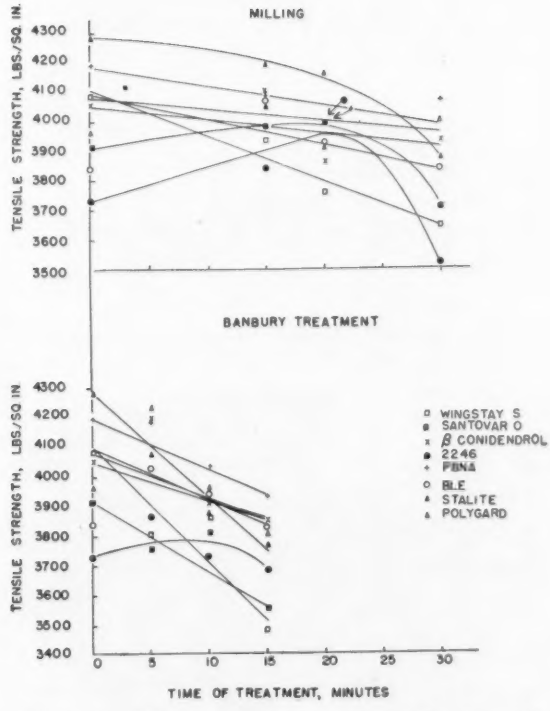

FIG. 4 — Effect of treatment on tensile strength (optimum cure, t_p).

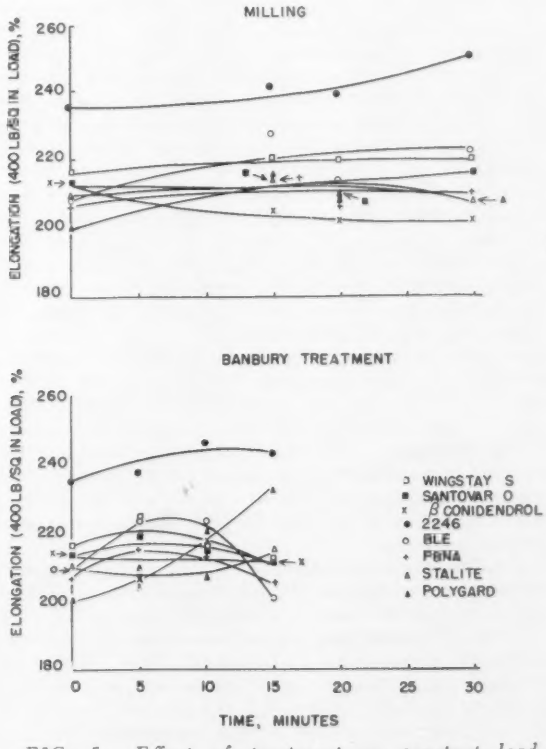

FIG. 5 — Effect of treatment on constant load elongation.

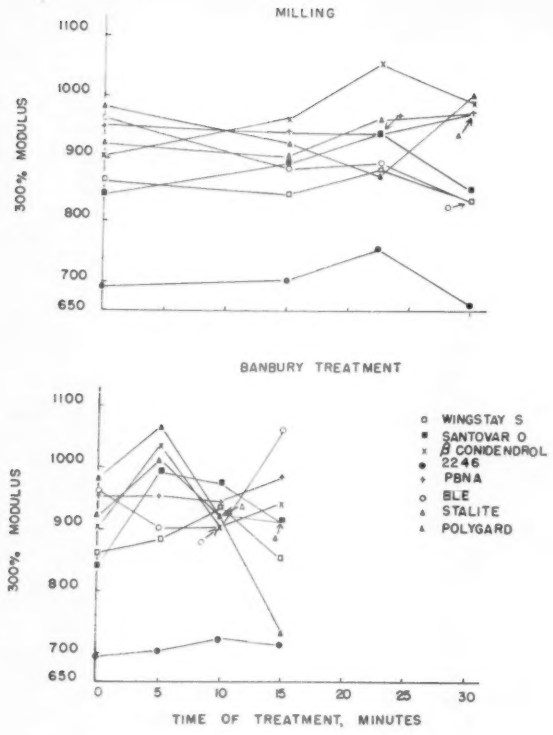

FIG. 6 — Effect of treatment on modulus (optimum cure, t_p).

with Polygard and beta-conidendrol. Heating the polymers protected with Stalite, PBNA, and BLE at this temperature indicated these antioxidants protected the polymers for 12 hours, but further heating for the same period caused some breakdown, increasing in the order given. The polymers containing Santovar O, 2246 and Wingstay-S were not protected against breakdown, as breakdown occurred immediately. The rate of breakdown was the highest for the polymer containing Santovar O and lowest with Wingstay-S; 2246 was intermediate.

The changes in DSV and Mooney viscosities with milling at 250°F. for the polymers containing the eight antioxidants are shown in the top set of curves in Figures 2 and 3. The relative order of DSV breakdown is close to that obtained by heating the polymers at 200°F., with the exception that the polymer containing Wingstay-S had not decreased on milling 15 minutes but then broke down rapidly, and further milling of the polymers containing the more protective antioxidants beyond 15 minutes caused the viscosities to decrease. The change of viscosity as measured by Mooney is more gradual or uniform in rate than that measured by dilute solution.

The changes in the viscosities of the polymers with Banbury treatment at temperatures of about 310°F. are shown in the bottom curves of Figures 2 and 3. The higher temperature and additional mechanical work by Banbury treatment as compared with milling, apparently caused more rapid breakdown and resulted in less spread in viscosity with the polymers containing the different antioxidants. The polymers containing Santovar O and 2246 broke down the fastest; the Wingstay-S sample mixed for 5 minutes broke down to the same extent as that milled for 30 minutes. The polymer containing beta-conidendrol broke down at the lowest rate. It seems evident that sufficient mixing at a high enough temperature will cause crosslinking and a rise in Mooney viscosity, and that the type of antioxidant will delay this reaction.

Stress-strain and constant load elongation data were obtained for vulcanizates of the original and the three milled and the three Banbury treated polymers containing each of the antioxidants. The tensile strength and the elongation (400 pounds per square inch) values at the optimum cure determined by t_p *(3)* are shown in Figures 4 and 5, respectively. The polymers which showed the greatest decrease in tensile strength with increase in milling time were those stabilized with Polygard and Wingstay-S, which correlates with the amount of breakdown found with Wingstay-S but not with Polygard. The polymers containing Santovar O and 2246 showed first an increase in tensile strength, but when milled between 20 and 30 minutes, a marked decrease, but the tensile strength of the polymers containing PBNA, BLE, Stalite, and beta-conidendrol were relatively unaffected by milling, which does correlate with the little breakdown observed.

With Banbury mastication, the Polygard and Wingstay-S stocks, and possibly also the Santovar O stock, again showed the highest rate of decrease in tensile values. The tensile values of the polymers containing the other antioxidants show much less change with the time of Banbury mastication, with that containing 2246 the lowest.

The tensile values of the stocks containing the various antioxidants are substantially in the same order for stocks milled 15 minutes or Banbury treated 5 minutes. The highest tensiles at these times of mixing were obtained with the stocks containing Polygard, PBNA, Stalite, beta-conidendrol, and BLE, being about the same and in about the order given, and the lowest values were obtained with stocks containing Santovar O, 2246, and Wingstay-S, all being about the same but lower than

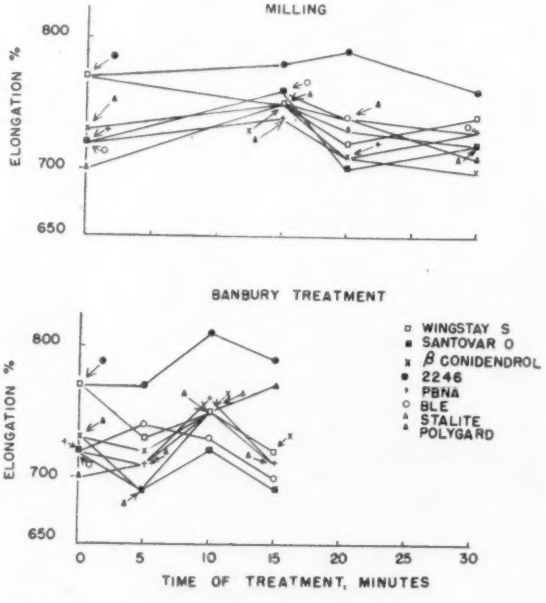

FIG. 7 — Effect of treatment on elongation (optimum cure, t_p).

the others. These tensile relationships seem to correlate generally with the amount of breakdown.

In Figures 6 and 7, the 300% modulus and percent elongation at t_p (optimum cure) are shown with the various times of heating. No correlation is apparent, and the points have been connected by straight lines to permit reading of the values.

The elongation data at a 400 lb./sq. in. loading for the milled polymer vulcanizates indicate, as shown in Figure 5, that the beta-conidendrol stock stiffened during 30 minutes milling and the 2246 stabilized polymers, and possibly that stabilized with BLE, softened. The remainder of the polymers showed little change in elongation with milling time. These changes in elongation do not correlate with changes in viscosity caused by milling, for the stocks stabilized with Santovar O and Wingstay-S did not behave in elongation as did that with 2246, yet they broke down more or less alike.

When the stocks were Banbury masticated at about 310°F., the stock made to contain 2246 again increased in elongation, correlating inversely again with the breakdown and similar to the results obtained by milling. The Banbury masticated stock containing Polygard broke down at about the same relative rate as did that with 2246, but increased in elongation with time of mixing at a higher rate than did that with 2246. The stock containing BLE increased in elongation with time of mastication, but then stiffened markedly when mixed 15 minutes. This correlates with both the Mooney and DSV breakdown curves.

The changes in viscosities of the other five polymers are of about the same magnitude and direction, yet the changes in elongation are not marked enough to show definite trends. As elongation is probably the best means of measuring stability of vulcanized stocks, these results may have considerable significance in evaluating

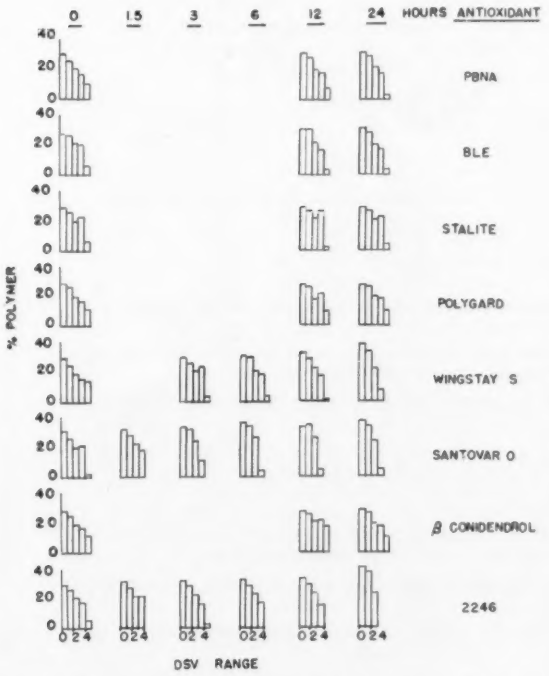

FIG. 8 — Molecular weight distribution (polymers aged at 200°F.).

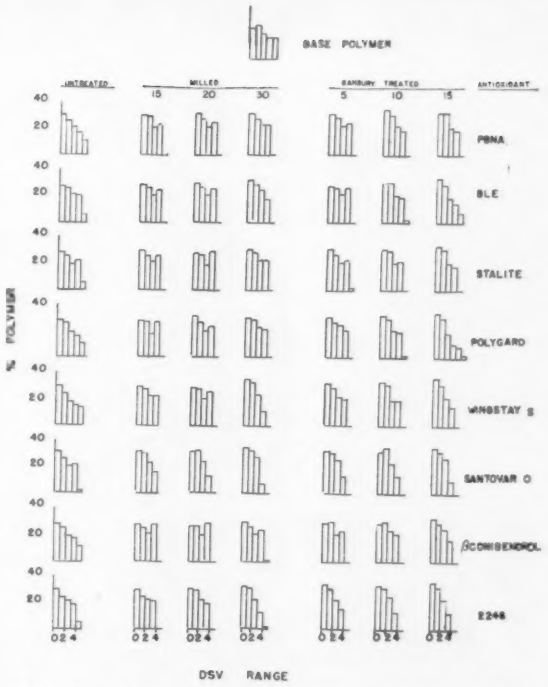

FIG. 9 — Molecular weight distribution (note base polymer).

the merits of the antioxidants with respect to heat stability.

The authors believe that it is generally accepted that a decrease in DSV and ML-4 viscosity is generally accompanied by a decrease in the tensile value and a less stiff and more extensible vulcanizate. Milling and Banbury mixing of these same stocks, which were similar except for the antioxidants, resulted in differing rates and amounts of breakdown in DSV and ML-4 viscosity, but nevertheless in breakdown in all cases, except for the Banbury mastication of the polymers, which underwent little change in DSV and ML-4 viscosity between 10 and 15 minutes of Banbury treatment. Yet in spite of this decrease in viscosity, tensile and elongation both increased and decreased with decrease in viscosity; this must mean that some change other than decrease in viscosity *per se* is involved.

Previous work with hot rubber *(4)* had indicated that milling affected the changes in molecular weight distribution and branching. The slopes of the lines of concentrated solution and dilute solution viscosity versus concentration of the various heated, milled and Banbury treated stocks in this present work did not vary significantly with the amount of treatment (data not shown). As the polymer used was cold rubber, thought generally to be relatively unbranched as compared with hot rubber, it is not surprising that the treatments used were not such as to cause sufficient changes in branching to be measured by these methods. However, the following discussion will indicate that the ratio of the change of the Mooney viscosity to that of the dilute solution viscosity does correlate significantly with the ratio of high to low molecular weight, provided the comparison is made with the same polymer. It is also indicated by examination of the extreme case (15-minute Banbury

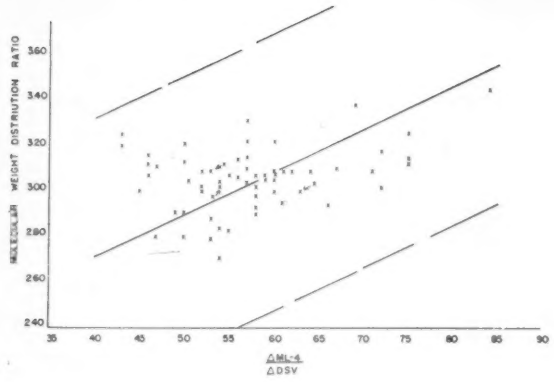

FIG. 10— $\frac{\Delta ML\text{-}4}{\Delta DSV}$ versus molecular weight distribution ratio.

treatment where the changes are large and measurements are probably more accurate) that the antioxidants affect the point in the chain where scission occurs, and by inference this correlates generally with tensile and elongation.

The changes in Mooney and dilute solution viscosity and in molecular weight distribution (see Figures 8 and 9) were analyzed statistically. The △ML-4 and △DSV values are the difference between the observed values for the treated samples of polymer and the values obtained for a sample of the base polymer which had been vacuum dried and which contained no antioxidant. The molecular weight distribution ratio was calculated by dividing the summed products of the weight fraction of polymer times the average dilute solution viscosity of each fraction for the high 50% of the polymer by the summed products for the low 50% of the polymer. In the statistical analysis only the $\frac{\Delta ML\text{-}4}{\Delta DSV}$ values calculated from changes in Mooney viscosity greater than 4 ML-4 and in dilute solution viscosity greater than 0.07 (i.e., those showing a significant change) were used.

A plot of the data showing the regression line (the best straight line) and the 95% confidence limits is shown in Figure 10. The correlation was significant to greater than the 0.001 level. Although the 95% confidence limits were fairly wide, ±0.61 molecular weight distribution ratio units, the range indicated is due in part to the degree of variability which is inherent in the calculated values of $\frac{\Delta ML\text{-}4}{\Delta DSV}$ and the molecular weight distribution ratio. This inherent variability could account for about 50% of the calculated range in the 95% confidence limits.

Thus, the data substantiate that the ratio of change in Mooney viscosity to change in dilute solution viscosity is a measure of distribution ratio, or where the break in the polymer chain occurs. This change has not been correlated with physical properties for the treated polymer containing the various antioxidants. Likewise, change in branching as measured by DSV or CSV has not been correlated with physical properties nor has the general breakdown as measured by Mooney or dilute solution viscosity been correlated with tensile values, suggesting either that the errors involved are too large to permit correlation, or more likely that the three variables follow opposite trends in many cases.

Tensile strength values of the various untreated stocks showed a significant spread; however, after 15 minutes of milling or 5 minutes Banbury mixing the range of tensile values is practically within experimental error of the test, making valid comparison difficult.

SPECIAL NOTE

The work discussed herein was performed as a part of the research project sponsored by the National Science Foundation.

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Coming Next Month...

"The Effect of High Temperature on the Properties of Organic and Silicone Rubber"—by G. M. Konkle, J. T. McIntyre and J. V. Fenner, Dow Corning Corp., Midland, Mich.

A discussion of elevated temperature aging in which the data show that in evaluating rubber for high temperature use, both aging and testing should be performed at elevated temperatures.

"Stress Relaxation Versus Sealability of MIL-R-900 Gasket Materials"—by S. A. Eller, New York Naval Shipyard, Brooklyn, N. Y.

An illustrated description of a stress relaxation apparatus whereby such properties of elastomers as surface tension and penetration resistance in addition to stress relaxation may be measured.

"The Use of Accelerators in the Vulcanization of Rubber."

Report of a symposium sponsored by the Akron Rubber Group in which the keynote question centered around the use of accelerators as adapted toward the special properties of the end product.

"How Humidity Conditioning of Meteorological Balloons Speeds Production"—by Francis B. Casey, Dewey and Almy Chemical Co., Cambridge, Mass.

How a meteorological balloon maker synchronizes drying operation into mass production lines by using a simple air conditioning system.

Plus several short practical articles.

Temperature Studies of the Air in a Truck Tire

By G. G. RICHEY, R. H. HOBBS and R. D. STIEHLER
National Bureau of Standards, Washington 25, D. C.

The temperature of the air in a tire determined directly by means of a thermocouple was compared with that determined indirectly from the observed pressures. The latter temperature was calculated from the pressure-volume-temperature relationship for an ideal gas. The values of the temperature determined by the two methods agreed within 1½ degrees Fahrenheit. The temperature differences in the air and between the base and crown of the inner tube were also determined while the tire was rotated under load. Both differences were found to be dependent on the speed of rotation of the tire. When the tire was stopped, the temperature distribution in the air changed to an extent that would preclude reliable measurements of the air temperature in a hot tire by means of thermocouples.

TIRE engineers are interested in the operating temperatures of tires since they reflect the amounts of power loss and affect the service life. In the case of truck tires, the operating temperature is a limiting factor in the choice of materials used in their construction. Although various methods are used in the industry to measure this temperature, few papers on this subject appear in the literature.

Operating temperatures have been measured while the tire is running by means of thermocouples vulcanized or inserted into the tread or plies, but the life of these couples has been extremely brief because of breakage from the repeated flexing of the tire running under load. More frequently, measurements have been made by inserting thermocouples under the tread or in the plies after stopping the tire.

A series of measurements made in this manner as the tire cools have sometimes been plotted and extrapolated to zero time to estimate the operating temperature at specific locations. This method has several deficiencies including (1) the difficulty in inserting each thermocouple to the same depth each time, (2) the uncertainty in the extrapolation due to the change in temperature distribution within the tire, and (3) errors caused by heat conduction along the wires. Furthermore, no means is available to indicate how the measurements so made should be treated to obtain a value for either an average or a maximum operating temperature of the tire.

Ellenwood many years ago *(1)* developed a method for determining the average temperature of the air in tires and recognized its advantages over measurement of the tire temperature itself. He preferred to determine this temperature indirectly by calculations from the observed pressure changes because of the temperature variability in the air of a rotating tire. Differences in the values of the temperature obtained with thermocouples and calculated from the pressure changes were attributed to a gradient in the air and heat conduction along the thermocouple wires.

Observations at the National Bureau of Standards on the various methods for determining relative tire temperatures led to the conclusion that direct measurement of air temperature offered the greatest promise. This study was undertaken to determine a reliable method for making such measurements.

Methods Employed

Average Air Temperature: Two methods were employed to determine the average air temperature. In one method, the temperature was measured directly by means of a copper-constantan thermocouple inserted through the valve stem. In the other method, the temperature was determined indirectly from the change in pressure of the air.

A schematic diagram of the arrangement for the measurement of the air temperature and pressure is shown in Figure 1. A thermocouple junction was inserted through the adapter (C), and valve stem (B), to position A. The latter was 6½ inches beyond the bottom of the valve stem for a 9.00-20 tire (approximately 0.7 d or 70 percent of the inside height of the casing). This depth was about the maximum possible without breakage during running. The thermocouples were made from 7-strand, 36-gage, copper-constantan duplex wire having nylon insulation.

The copper lead wire was connected to the temperature recorder (T) through the slip ring (D) and the brush (E). The constantan lead wire was connected at R to a copper wire from the slip ring (D′) to form a thermocouple junction which rotated with the tire and the slip rings. A copper wire from brush E′ was con-

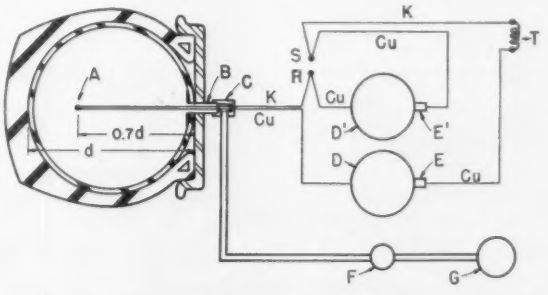

FIG. 1—Schematic arrangement for measurement of air temperature and pressure.

A—Copper-constantan thermocouple. B—Valve stem. C—Adapter. D-D′—Copper slip rings. E-E′—Copper-graphite brushes. F—Rotating joint. G—Precision air pressure gage. R—Rotating copper-constantan thermocouple. S—Stationary copper-constantan thermocouple. T—Temperature recorder. Cu—Copper lead wire. K—Constantan lead wire.

nected at S to a constantan wire from the temperature recorder to form a stationary thermocouple junction. The junctions R and S were at the same radial distance from the axle and spaced about ½ inch apart axially. These junctions were placed in selected locations so that their temperatures were essentially the same when the tire was rotating. This arrangement permitted the use of copper lead wire to each slip ring and brush. Since these junctions opposed each other electrically, the net effect on the recorded temperature was negligible.

The brushes consisted of 90 percent copper and 10 percent graphite by weight. A thermocouple of this material and copper yielded less than 1 microvolt for a temperature difference of 20°F. In order to ensure a continuous circuit free from brush chatter, two brushes were located on each slip ring approximately 180 degrees apart.

The negligible potential at the slip rings was verified by placing the stationary junction S in a benzoic acid cell *(2)* and the junction A near the junction R. The temperature measured while the tire was rotating was within 1°F. of the melting point of benzoic acid.

The air pressure was determined by means of a precision gage (G) connected to the valve stem through a rotating joint (F). The gage had been calibrated and found to be accurate within 0.1 percent over the entire indicating range. The volume change was determined in the following manner: The initial tread circumference was measured by means of a steel tape with the tire inflated to 65.00 ± 0.05 pounds per square inch gage and at a temperature of approximately 100°F. The thermal expansion of the tire was determined by running the tire at 50 miles per hour until the air temperature increased to 190°F. The tire was stopped quickly, and the tread circumference was measured at this temperature. The volume change was calculated from the change in tread circumference.

The growth of the tire was determined from tread circumference measurements taken at the conclusion of each run after cooling the tire to approximately 100°F. The total air leakage during each run was also determined by observing the air pressure at the start and end of each test with the tire under a load of 2,875 pounds. Applying the pressure, volume, temperature relationship for an ideal gas, the average air temperature was calculated for each operating condition from the observed changes in pressure and volume.

Temperature Variations in the Air: Two differential thermocouples were made from copper-constantan 7-strand, 36-gage, nylon-insulated wire. In one experiment, the junctions of the thermocouple were positioned on a small wooden rod so that they were ½-inch and 7½ inches, respectively, beyond the bottom of the valve stem. In order to reduce the heat conduction to or from each junction, approximately 18 inches of constantan wire connecting the junctions was spirally wrapped on the rod. Likewise, approximately 24 inches of copper wire from each junction was also spirally wrapped on the rod.

In another experiment, a similar thermocouple was used having junctions 1 inch and 7 inches beyond the bottom of the valve stem. Since only copper leads were brought out of the tire from these differential thermocouples, the use of the compensating junctions R and S in the slip ring assembly of Figure 1 were not necessary. Each lead was connected directly to a slip ring and connections from the brushes to a potentiometer were made by means of copper wire. The temperature difference in the air was determined at each operating condition.

The temperature differences in the air were also measured with each differential thermocouple after rotation of the tire stopped. The tire was turned manually to four positions each 90 degrees apart so that the valve stem was successively at top dead-center, directly over the area in contact with the drum, bottom dead-center, and directly opposite the area in contact with the drum. The time, position, and maximum temperature difference observed during a 10-minute period after rotation stopped were recorded.

Temperature Difference between Crown and Base of the Inner Tube: A small hole about ⅛-inch in diameter was cut in the crown of a 9.00-20 heavy-duty truck tube and a similar hole was cut in the base. Two copper-constantan 7-strand, 36-gage, nylon-insulated thermocouples were inserted into the tube through the valve stem. A junction was drawn up through each of the holes and pressed on to the adhesive side of vulcanizing gum tube repair stock and the repair material positioned so that the junction was directly over the corresponding hole. The gum stock was vulcanized in these positions.

Using this tube in the same tire that had been used for the previous measurements, the temperature difference between crown and base of the inner tube was determined by means of a precision potentiometer for each operating condition. These measurements were made after the tire had attained steady state conditions except in one instance. During the run at 50 miles per hour, the junction in the crown of the tube open-circuited shortly before a steady state was attained. It was possible, however, to correct the value obtained on the basis of similar observations made earlier in the run.

After the junction in the crown broke, the temperature of the base of the tube was measured by means of the remaining junction at each operating condition. The temperature of the crown of the tube was determined by means of another thermocouple inserted 15 inches inside the tube. This length was sufficient to hold the junction of the couple by centrifugal force against the crown of the tube. Temperature measurements were made in this manner at each operating condition.

TABLE I—PRESSURES AND TEMPERATURES OF AIR IN THE INNER TUBE OF A 9.00-20, 10-PLY RATING TRUCK TIRE, LOAD 2,875 POUNDS, INITIAL INFLATION PRESSURE 65 PSI GAGE AT 100°F., THERMOCOUPLE INSERTED 6½ INCHES

Speed (mph)	10	30	50
Decreasing Speed Condition			
Observed pressure (psi gage)	68.80	73.55	77.85
Calculated temperature (°F.)	127.5	162.0	192.5
Observed temperature (°F.)	127.5	161.5	191.0
Increasing Speed Condition			
Observed pressure (psi gage)	68.70	73.25	77.25
Calculated temperature (°F.)	126.5	159.0	188.5
Observed temperature (°F.)	126.5	159.5	189.5

Operating Conditions

A 9.00-20, 10-ply rating heavy-duty truck and bus tire mounted on a 20x7 advanced rim and Dayton wheel was used. This tire had been operated on the testing equipment under various load conditions for more than a thousand miles. When the temperature of the air in the tire (as indicated by the thermocouple) attained 100° ± 1°F., the pressure was adjusted to

TABLE II—TEMPERATURE DIFFERENCE IN THE AIR OF 9.00-20, 10-PLY RATING TRUCK TIRE, LOAD 2,875 POUNDS, INITIAL INFLATION PRESSURE 65 PSI GAGE AT 100°F.

Speed (mph)	10	30	50
ΔT with couple A (°F.)*	2.1	3.1	3.5
ΔT with couple B (°F.)*	4.8	5.6	6.4

* The junctions of couple A were placed 1 inch and 7 inches beyond the bottom of the valve stem. The junctions of couple B were placed ½-inch and 7½-inches beyond the bottom of the valve stem.

65.00 ± 0.05 pounds per square inch gage as measured with the precision pressure gage. This adjustment of initial inflation pressure was made with the tire under a load of 2,875 pounds (approximately 85 percent of the maximum rated load as recommended by the Tire and Rim Association). The load was maintained constant at 2,875 pounds throughout all the tests.

Measurements were made at speeds of 10, 30 and 50 miles per hour after the tire had reached steady state conditions at each speed. Steady state was assumed to be attained when the change in pressure of the air did not exceed 0.1 pound per square inch in a 10-minute period. The tread of the tire was in contact with a steel drum 1/300 mile (17.6 feet) in circumference and 14 inches wide. No tractive effort other than bearing friction and windage losses was applied to the drum. The ambient temperature was maintained at 100° ± 2°F.

Results and Discussion

Temperature of the Air: The temperature of the air obtained by means of the thermocouple inserted 6½ inches inside the inner tube, the corresponding temperatures calculated from the ideal gas law, and the observed air pressures are given in Table I for each operating condition. In calculating the temperature, correction was made for the thermal expansion of the tire, which amounted to 0.1 percent for a rise in temperature of 20°F. No other correction was included since the growth was negligible and air leakage during a test did not exceed 0.1 pound per square inch.

The mean of the two observed temperatures and the mean of the two calculated temperatures for each operating condition agree well within 1°F. The temperatures in the second run (increasing speed conditions) are about 2°F. lower than those in the first run. This difference in both the observed and calculated temperatures indicates that steady state conditions had not been completely attained when the measurements were taken. The agreement between the observed and calculated temperatures is slightly better at the lower temperatures (lower speeds) than at the higher temperatures (higher speeds) for both runs.

However, these results show that the temperature of a thermocouple junction inserted beyond the bottom of the valve stem to a distance approximately 70 percent of the inside height of the casing is very near the average temperature of the air in the tube of a truck tire. The use of the thermocouple method is simpler than the pressure method because the latter requires a high precision pressure gage (an accuracy within 0.1 pounds per square inch over the range) and the quantitative determination of various corrections.

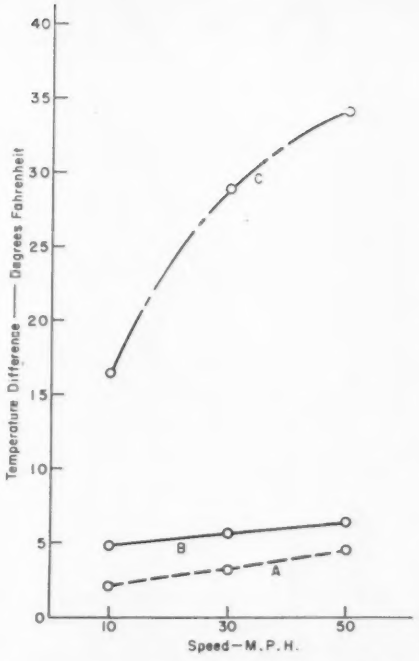

FIG. 2—Temperature differences in air and between crown and base of inner tube. Curve A is difference in air temperature between 1-inch and 7 inches beyond bottom of valve stem. Curve B is difference between ½-inch and 7½ inches beyond bottom of valve stem. Curve C is difference in temperature between crown and base of inner tube.

Temperature Difference in the Air: The temperature differences in the air obtained in the two experiments using differential thermocouples are given in Table II and Figure 2.

The increase in temperature difference with increase in speed of rotation of the tire is presumably caused by the increase in the amount of heat generated. The much smaller differences obtained with couple A indicates nearly uniform temperature in the center of the tire and a gradient near the base or crown or both. As will be seen later, the gradient is principally near the base.

The temperature differences in the air after rotation of the tire stopped varied as the tire was turned manually through 90 degree positions. A maximum difference of 16.5°F. was obtained 5 minutes after the tire was stopped with thermocouple B at the top dead-center position. It was inferred from these observations that measurements of the temperature of the air made after the tire is stopped may be subject to serious error.

Temperature Difference between Crown and Base of the Inner Tube: The temperature differences between the crown and base and the independent measurements of the temperatures of the tube at these locations are given in Table III and Figures 2 and 3.

It is seen that the temperature differences between the crown and base of the inner tube in Table III are in good agreement with the differences in crown and base temperatures measured in separate experiments.

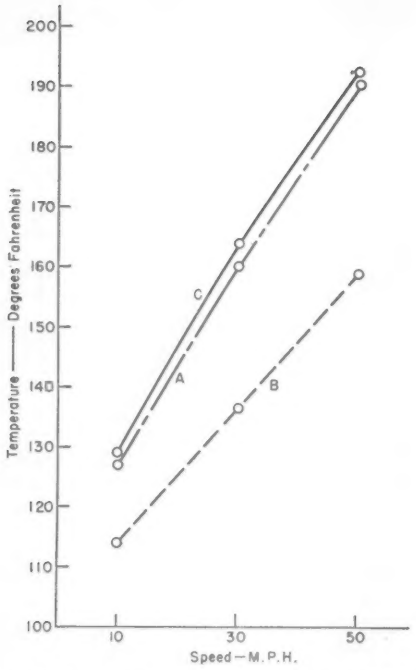

FIG. 3—Temperature in the inner tube. Curve A is the average temperature of the air. Curve B is the temperature at the base of the tube. Curve C is the temperature at the crown of the tube.

A comparison of the temperatures measured at the crown of the tube with the average air temperatures reported in Table I for the same operating condition reveals a difference of about 2°F. On the other hand, a similar comparison of the temperatures measured at the base of the tube reveals a difference of 13 to 31°F. These results are illustrated in Figure 3 and when considered in conjunction with those depicted in Figure 2 indicate that the temperature decreases from the crown of the tube to within 1 inch of the base (a distance of about 8 inches) by about 5°F. In the last inch above the base, the temperature decreases by 12 to 28 degrees, depending on the speed, and 80 to 90 percent of the decrease occurs within ½-inch of the base.

Although the temperature variation in the bulk of the air is small, it is important when measuring the temperature by means of thermocouples to use fine wire and insert the junction as near the crown as possible. In this way, the effect of radiation from the walls and

TABLE III—INNER TUBE TEMPERATURES AT THE CROWN AND AT THE BASE, LOAD 2,875 POUNDS, INITIAL INFLATION PRESSURE 65 PSI GAGE AT 100°F.

Speed (mph)	10	30	50
Temperature difference (°F.)	16.4	28.9	34.0*
Tube temperature, base (°F.)	114.0	136.5	159.0
Tube temperature, crown (°F.)	129.0	164.0	192.5

* The junction located at the crown of the tube open-circuited before a steady state was reached. The value of 34.0° F. was obtained from an observed value of 35.9 attained after running for 35 minutes at 50 miles per hour less an estimated decrease of 1.9 based on similar observations made at the other two speeds.

thermal conduction along the wire is minimized. If the junction touches the crown during flexing, the couple soon breaks. Insertion of the junction about 0.7, the distance between base and crown, is near the maximum possible when tires are tested under overloaded conditions.

Conclusion

The results show that reliable measurements of the average air temperature (within 1.5°F.) in a rotating tire can be made by means of a thermocouple inserted to a length of about 70 percent of the inside height of the casing. In going from the crown to the base of the inner tube, the temperature of the air decreases slowly (less than 1°F./inch) for 90 percent of the distance and rapidly near the base. When the tire is stopped, the distribution of the air temperature changes rapidly and large differences may occur throughout the air space. Hence, the temperature measured after the tire has stopped may be considerably different than that which exists while the tire is rotating and that calculated from the change in pressure.

Although this study was confined to a single tire under one load condition, a similar temperature pattern can be expected in any tire having an inner tube. In the case of tubeless tires, the temperature distribution between tire crown and rim might differ to some extent.

SPECIAL NOTE

This work was performed as part of a research project sponsored by the Federal Facilities Corporation, Office of Synthetic Rubber, in connection with the Government Synthetic Rubber Program.

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(1) Ellenwood, F. O., "Temperature of Pneumatic Truck Tires," *S.A.E. Transactions*, Vol. 27, Part II, p. 449 (1922).

(2) Schwab, F. W., and Wichers, E., *J. Res. Nat. Bur. Stand.*, Vol. 34, p. 333 (1945); also issued as Research Paper No. 1647.

Getting Double Life from a Conveyor Belt

THE method of lengthening the life of a conveyor belt by turning it through 180 degrees, or "end-for-end", equalizes wear and considerably prolongs the life of the belt. This method gave one belt user an idea. He operated a long conveyor belt and the wear was severe due to the nature of the material handled. Conditions in the plant were such that the belt had to be considerably wider for handling peak loads than was necessary for normal conditions. In fact the peak—occurring less than ten percent of the operating time—was more than twice the load handled during normal operations.

With these facts in mind, the operator arranged the installation in such a way that the lighter load was carried off center, and the point of impingement of the load while falling on the belt was distributed over one side from the center to the edge. As a result, most of the wear takes place on one side of the belt, and, because of this fact, the belt can be reversed and more than double the wear can be obtained as compared with carrying loads in the middle of the belt and permitting the impingement to occur directly in the center at all times.

W.F.S.

Meeting Power Requirements of the Rubber Plant with Large A-C Motors

By C. E. BUCHAN

District Manager, Electric Machinery Manufacturing Co., Cleveland, Ohio

THE processing power requirements for the rubber industry are high, exceeding those of many other industries on a tonnage basis. Mixing rubber with various compounding ingredients preparatory for extruding, calendering or molding requires much energy; thus the mill room accounts for the bulk of the power consumption in a rubber plant and requires the largest motors.

The character of the load, the large power requirements and other features special to milling and mixing rubber make it essential that several factors of the motor and control be given careful consideration. Among these factors are motor horsepower and voltage; starting, pull-in and pull-out torques; motor starting kva with relation to power supply limitations; protection of motor insulation from carbon black and other elements, and safety code requirements for open mills.

Mill Drives

The machines having very general use in the preparation of rubber stock are the two-roll open mills. The functions of these mills are as follows: (1) Breakdown and cracker mills which usually have one or two corrugated rolls for tearing and shearing the stock under compression; (2) Mixing, blending, warm-up, sheeting and refining mills which have smooth rolls closely spaced.

Mills may be motorized individually in groups of two or four or a single motor may drive a long line of mills (Figure 1).

The motor horsepower requirements are determined by the size of mill, type of stock, nature of the processing, and by the number of mills connected to the motor. For motors driving individual mills subject to widely varying load, the ratio of peak load to average load will be a prime consideration. Since the heating of the motor varies with the square of the current input, the heating factor of the load will in effect be determined by the ratio of root-mean-square value of the current to the average current for the load cycle, and thus will be directly related to the nature and time of the load or batch cycle. For group driven mills, the load diversity between mills will tend to equalize the ratio of the rms to average current so that horsepower requirements can more safely be based on considerations of average horsepower of the total load. Horsepowers usually recommended by the manufacturers for general-purpose production mills are shown in Table I.

TABLE I—RECOMMENDED HORSEPOWERS FOR GENERAL-PURPOSE PRODUCTION MILLS

Roll Size (Inches)	Weight of Batch (Pounds)	Recommended Horsepower
12x24	25	25
16x30	45	50
18x42	75	60
20x48	95	75
20x60	125	100
22x60	125	100-150
24x60	140	150
24x84	200	150-200
26x84	225	150-200
28x48	250	200

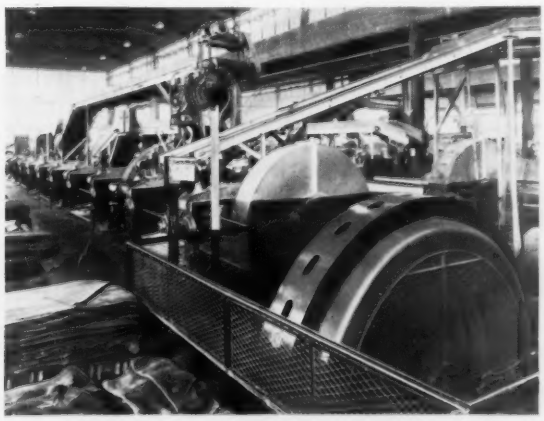


FIG. 1—View of a line of six mills at one of Firestone's tire plants. The mills are driven by a 900 hp, 120 rpm direct-connected synchronous motor.

Synchronous Motors

Rubber mills can be driven by either induction motors or synchronous motors. The higher efficiency, high power factor, and the superior safety-stop braking characteristics of synchronous motors have resulted in their wide-spread use in all types of rubber plants for the larger units (Figures 2, 3 and 4).

The early synchronous motors applied to mills were high-speed units using reduction gears. Later with the development of high starting torques at low motor speeds, the inherently favorable characteristics of the low-speed synchronous motors resulted in their direct application to mill line shafts at 90 to 120 rpm with the elimination of the reduction gear.

Figure 5 shows a schematic diagram of a direct-connected drive on an open-roll rubber mill. The synchronous motor drives the line shaft and pinion at 90 to 120 rpm. The bull gear is direct-connected to the back

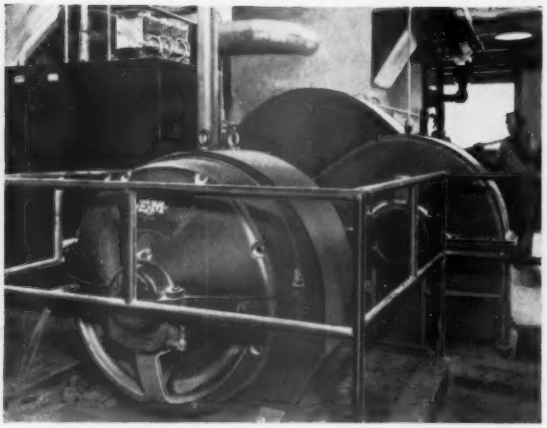


FIG. 2—Rubber mill at the South Braintree, Mass. plant of the Armstrong Cork Company which is driven by a 200 hp, 600 rpm synchronous motor.

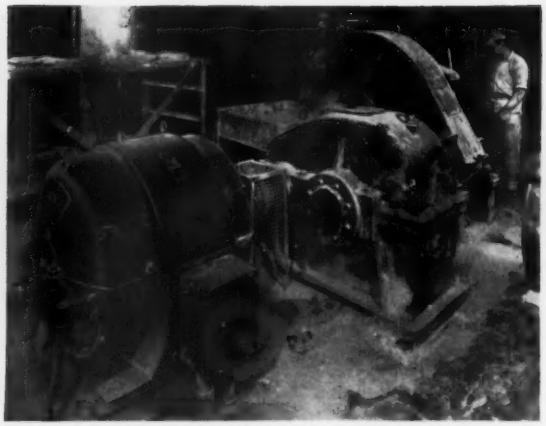


FIG. 3—Rapid Roller Co., Chicago, Ill., uses synchronous motors to drive its rubber mills. This recent unit is 150 hp, 720 rpm, 0.8 power factor.

roll which is geared so that the front roll runs slower than the back roll to provide shearing action on the rubber stock.

The low-speed motor gained wide popularity and was extensively used. The advantages of the low-speed, direct-connected motor are reduction in over-all length, elimination of the high-speed coupling and gear, and the simplicity of direct connection.

More recently the lower first cost of the motor and reducer gear combination has favored the use of high-speed motors (Figure 6) with motor speeds most commonly at 600 or 720 rpm, but occasionally as high as 1200 rpm and as low as 450 rpm.

Features of Synchronous Motors

Power Factor: Synchronous motors are available for rated operation at unity power factor or at leading power factor. Because they usually make up the major part of the load, synchronous motors provide the ready means of maintaining high plant power factor. Motors rated 0.8 leading power factor inherently lend themselves to most economical design for the high torques required for mill line drives; also, they will deliver, at rated load and excitation, 60 percent of the rated horsepower in leading reactive kva.

Unity power factor motors deliver no leading reactive kva at rated load, and when designed for the high torques needed for a mill drive, have a frame size and first cost about equal to an 0.8 power factor motor. Hence, unity power factor motors are usually selected only where the mill power factor, due to the use of many synchronous motors, is already high and added leading reactive kva would be objectionable.

Torques: While mill lines are normally started unloaded, it is always necessary, in case of momentary power failure or for other reasons, to be able to start up the mills in their loaded condition. To accomplish this, a starting torque of 125% of full-load motor torque and a pull-in torque of 125% is generally necessary. Starting the synchronous motor is accomplished by induction motor action using the amortisseur or squirrel-cage winding built into the pole faces of the rotor. The successful application of synchronous motors, particularly at low speeds, dated from the time suitably designed heavy-duty starting cages were developed. For rubber mill duty, the cage must have rugged mechanical construction and high thermal capacity to insure successful starting under heavy load.

A pull-out torque of 250% is usually required to insure that the motor will operate through peak loads. This value of pull-out torque is normal to the high starting torque, 0.8 power factor synchronous motor.

Safety Stopping: Safety stopping for open-roll mill motors is accomplished either by dynamic braking for synchronous motors or by plugging for induction motors. In dynamic braking the motor terminals are switched from the line to a braking resistor with full excitation maintained. Acting as a generator, the motor quickly dissipates its stored flywheel energy and comes to a stop. To insure that excitation is available the synchronous motor must be excited from a d-c bus or other constant voltage source. In plugging, the induction motor is switched to a full reverse position on the line. The plugging switch is opened by a zero speed switch on the motor, when the motor comes to rest.

The inertia of the mills themselves is low, so that quick stopping involves mainly the overcoming of the motor flywheel effect. The stored flywheel energy of

FIG. 4—A 250 hp, 600 rpm synchronous motor driving a mill at the Wayne, Mich. plant of Minnesota Mining. An intake duct is used to supply ventilating air from a clean source.

TABLE II—RECOMMENDED HORSEPOWERS FOR BANBURY MIXERS

(Standard Speed)

Size of Banbury	Motor Horsepower
3a	150-300
9	200-400
11	300-600
27	800

the motor will vary with its speed and Wk^2 and can be calculated on a per horsepower basis by the following formula:

$$\frac{rps^2 \times Wk^2}{hp \times 1.63} = \text{foot-pounds per horsepower}$$

where rps = motor revolutions per second,
Wk^2 = flywheel effect in foot-pounds of the motor rotor, and
hp = motor horsepower.

Tests on both synchronous motors and induction motors in a wide range of horsepowers and speeds have shown in general that a motor which has a value of stored energy of 500 foot-pounds per horsepower or less can be stopped without difficulty in 14 inches of roll travel on an 84-inch mill operating at or about 100 feet per minute.

Stopping performance for any specific motor can be calculated from the design constants of the motor. The optimum value of resistance for dynamic braking can also be predetermined.

Other Types of Motors

Squirrel-cage induction motors are used in the smaller horsepower ratings where their simplicity and lower first cost is an advantageous factor in selection. Safety stop is provided by plugging control, and the motor must have suitable torque characteristics on reversal to meet safety-stop requirements. Limitations from this standpoint generally restrict the use of these motors to the general-purpose range, 200 hp and smaller, at speeds of 900, 720, and 600 rpm.

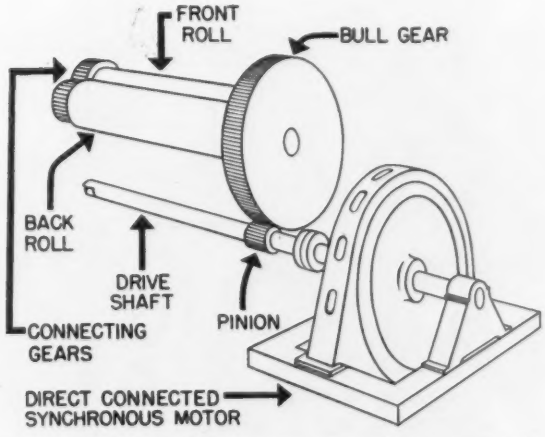


FIG. 5—Schematic diagram of a direct-connected drive on an open-roll rubber mill. The synchronous motor drives the line shaft and pinion at 90 to 120 rpm.

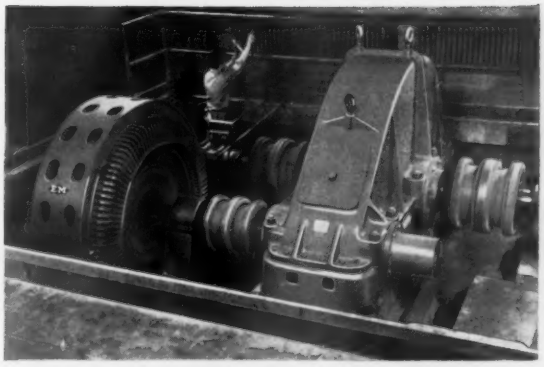


FIG. 6—High-torque synchronous motor rated 1000 hp, 514 rpm, 2200 volts unity power factor, drives a group of mills through a reduction gear at the Cumberland, Md. plant of the Kelly-Springfield Tire Co.

Wound-rotor motors are started with a variable resistor in the secondary circuit of the motor which permits the motor to develop 125% starting torque with less than 200% starting kva. The wound-rotor motor is thus used to advantage where there are power system motor starting limitations. Plugging is used for safety stop and best results are obtained when resistance is inserted in the secondary circuit during motor reversal.

Banbury Drives

The Banbury, used in practically all large rubber plants for the mixing operation, consists of an enclosed water-cooled chamber which contains water-cooled mixing rotors. After the rubber is mixed in the Banbury it is usually discharged into a pelletizer, two-roll batch-out mill or a cooling tank.

The Banbury drive is characterized by the following:

(1) It is a very heavy-duty application involving cyclic operation and high peak loads. Individual motor drive is general practice and therefore the motor must be suited to the specific requirements of the Banbury.

(2) Two rotor speeds may be used to accommodate stocks or the processing method, requiring a two-speed motor.

(3) Carbon black and other compounding ingredients air-borne in the vicinity of the Banbury make special insulation necessary in order to protect the motor.

The usual horsepower specifications for Banburys at standard speed are shown in Table II. However, the actual power requirements may vary with variations in materials, processing, and the tendency towards higher speeds. The power requirements have tended to increase.

Some characteristics of Banbury load are shown in Figure 7. Two types of rubber stock were mixed in a No. 11 Banbury and the kilowatt input was plotted on charts. The peak load when the batch was introduced was high, equal to about twice the full-load rating of the motor in the lower curve, and decreased to approximately full load when the batch was completed. The ratio of batch time to idle time was about three to one and the average horsepower was 621 for the top curve and 674 for the lower.

With this type of load, the heating factor of the motor current times the average horsepower requirements becomes the determining factor in motor operation and selection. The heating factor is, in effect, the root-

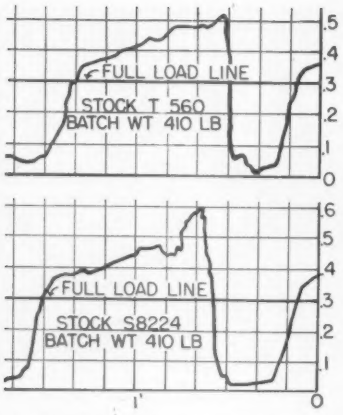


FIG. 7—Kilowatt charts for two compounds mixed on a No. 11 Banbury, 40 rpm paddle speed. A 600 hp synchronous motor was used to drive the mixer.

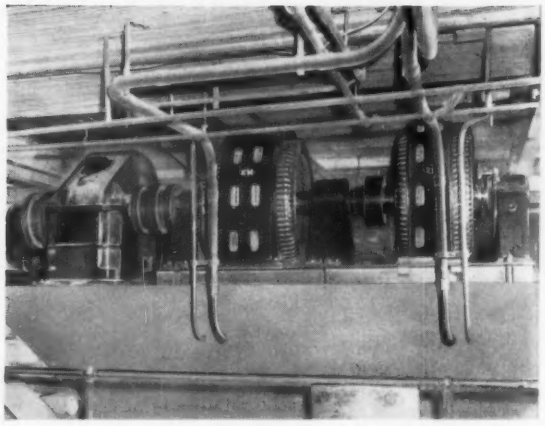


FIG. 9—Synchronous motors in operation at the Seiberling Rubber plant are rated 250-500 hp, 450-900 rpm and drive a Banbury through a reduction gear.

mean-square current divided by the average current for the load cycle, and reflects the fact that the heating of the motor windings increases as the square of increased current input. The heating factor will vary with the individual motor and load cycle, and is greatly influenced by the ratio of batch time to idle time.

Synchronous motor drives provide the advantageous features of high efficiency and high power factor operation discussed under mill drives. The widespread application of Banburys came after the development of high torque, low-speed synchronous motors. Thus, the direct-connected synchronous motor (Figure 8) was available and has been applied in speeds from 90 to 240 rpm in many installations to large size mixers or for group drives. Synchronous motors are now most commonly applied to Banburys in the higher speed ratings —900 rpm down to 450 rpm—in combination with a reduction gear (Figure 9).

Banburys generally use the same torque specifications as mill drives, namely, 125% starting torque, 125% pull-in torque and 250% pull-out torque. These starting torques provide for starting or reversing the mixer under load after momentary shutdown. The 250% pull-out torque gives a reserve for the high peak loads.

Two-speed synchronous motors can be supplied in the single-frame type, limited to a two-to-one speed ratio, and in the two-frame type. The two-frame unit (Figure 10), despite its somewhat greater floor space requirement, has these desirable advantages: (1) each motor has the simplicity and uncompromised design of the standard motor construction; (2) each motor is an independently operating unit, but advantage can be taken of the cumulative starting torque of both; (3) the arrangement is superior where speed is changed under load; (4) control is simpler, and (5) speed ratios can be whatever desired.

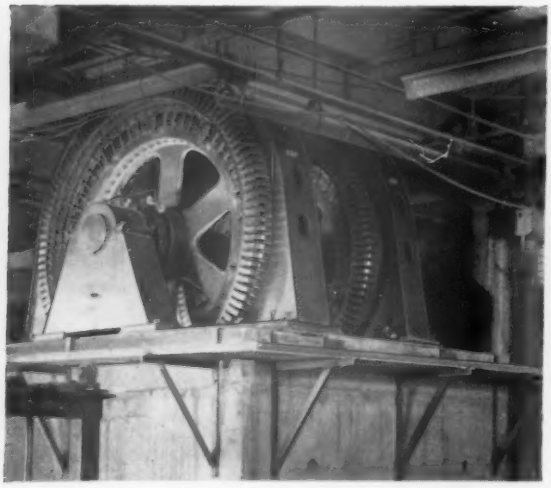


FIG. 8—These synchronous motors are rated 300-400 hp, 120-180 rpm, 0.8 power factor and are direct-connected to the Banbury.

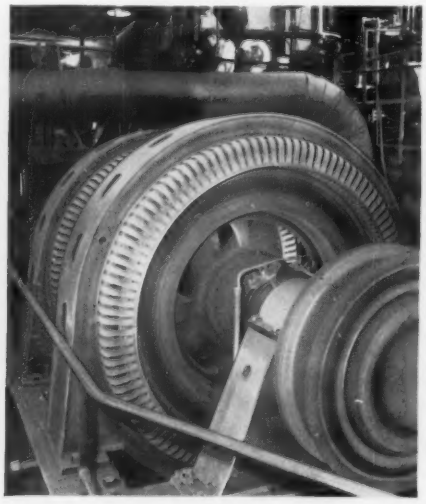


FIG. 10—Two-frame synchronous motors in use by General Tire are rated 450-600 hp, 180-240 rpm.

Where power factor correction is not needed, the lower cost and simpler control of the squirrel-cage motor may favor its selection. Wound-rotor motors are used primarily where there are power system limitations on starting current. They have the advantage of providing a controllable high starting or reversing torque up to 200 or 250% of full-load torque with proportionately little higher starting kva.

Both squirrel-cage and wound-rotor motors are available for two-speed drives. The motors are generally of the single-frame construction an two-to-one speed ratio, which affords the simplest, most economical design.

Motor Protection

Many older low-speed, open-type synchronous motors have operated for years under normal maintenance with little insulation trouble from carbon black and other airborne materials. However, particularly for Banburys, the higher conductivity of new carbon blacks, the prevalence of oil mist and other floating materials, and the use of high-speed motors with higher velocity of ventilating air have focussed increasing attention on the need for keeping the motor ventilation passages from getting plugged, and for prevention of insulation breakdown.

The large motors and control used for mill lines, Banburys, and plasticators require much less maintenance when located in a separate room, or separate ventilated housing, but in the majority of cases it is not practical to so locate the motors. Hence protection must be supplied by special treatment of the insulation of open-type motors or by motor enclosure.

Figure 11 shows coil insulation on a synchronous motor. The outer binder on the stator coils and connections is glass tape. The entrances of the coil leads into the coil are sealed and the entire stator winding is coated with multiple layers of oil-resistant varnish. The field coils on synchronous motors are sealed laminated phenolic flanges and are coated and baked with polymerizing varnish.

Although higher in first cost, the enclosed motor (see Figure 4) may be justified in terms of assuring lower maintenance and continuity of service. This type of motor has additional advantages in quieter operation and removal of motor heat from the Banbury area. Totally enclosed fan-cooled motors provide complete protection but are limited to the smaller induction motor ratings.

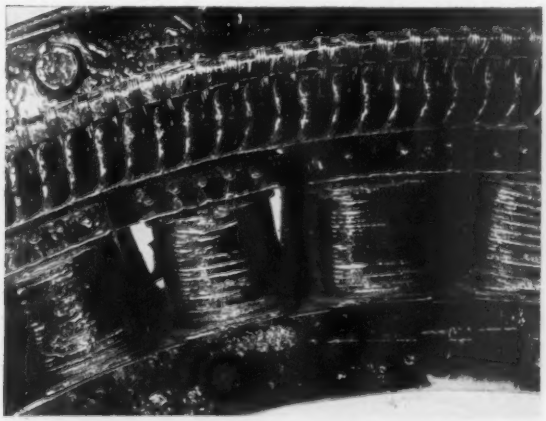


FIG. 11—Outer binder on the stator coils and connections shown above is glass tape. The coil leads into the coil are sealed and the entire stator winding is coated with multiple layers of oil-resistant varnish.

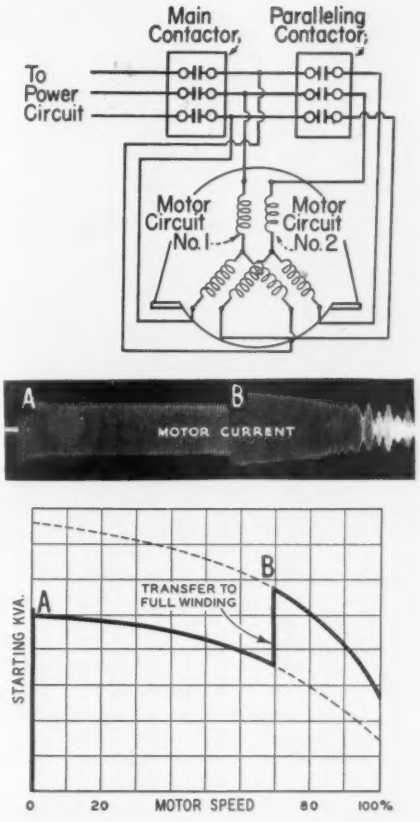


FIG. 12—Schematic of a two-step part-winding starting with an oscillogram and curve showing motor starting without the use of any auxiliary voltage reducing means.

Motor Control

Full voltage starting should be used for mill and mixer motors wherever possible because of simplicity and minimum first cost, and to enable the motor to deliver its high starting torques. Where power limitations make it necessary, reduced voltage starting using an auto-transformer or reactor (with accompanying reduction in starting torque) can be used, or, where applicable, part-winding starting can be employed.

This method, as shown in Figure 12, provides true increment starting without use of any auxiliary voltage reducing means. For two-step part-winding starting, circuit No. 1 of the motor is first connected to the power system thus energizing half the motor and drawing the reduced current shown by the oscillogram and curve. As the motor speeds up, circuit No. 2 is connected, drawing full winding current as shown.

Should the motor fail to start at A, the motor will smoothly transfer to full winding at B, applying full torque. The time interval between A and B allows the power supply to regulate to the new demand.

Part-winding starting eliminates the shock to the power system resulting from the complete opening of the circuit at transfer which occurs with auto-transformer starting. Where it is essential to limit the current to a very low value, a wound-rotor motor may be the best solution.

FIG. 13—Front view of a Hi-Fuse control unit showing various fuses, timing relays, field contactors and polarized field frequency relays.

Reversing control is used for mill and mixer motors to enable the motor to be reversed in order to release the load for restarting and for safety reversal. Magnetic reversing is usually recommended.

Because of the large capacity of power systems feeding most rubber company power plants, which are capable of producing large short-circuit current, provision must be made for adequate interrupting capacity either in the motor control or by back-up breakers. For motors on low-voltage circuits protection can be supplied by an air circuit breaker motor control available in 25,000, 50,000 and 100,000 ampere interrupting capacity ratings.

For large motors on 2300-volt or 4160-volt circuits the "Hi-Fuse", high interrupting-capacity control, manufactured by the Electric Machinery Manufacturing Co., can be used (Figure 13). The unit is available for use on power systems capable of a three-phase short-circuit of 150,000 kva at 2300 volts and 250,000 kva at 4160 or 4800 volts. Available maximum horsepower ratings are shown in Table III.

TABLE III—MOTOR HORSEPOWER RATINGS FOR HI-FUSE CONTROL

Voltage	Induction Motors (hp)	Synchronous Motors Unity P.F. (hp)	Synchronous Motors 0.8 P.F. (hp)
2300	1250	1500	1250
4160	2250	2500	2250
4800	2250	2500	2250

The Hi-Fuse control is metal enclosed, and is compartmented for segregation of the high-voltage and low-voltage circuits. The current-limiting power fuses limit and interrupt fault current. The fuses are coordinated with the relays for normal overload protection. The controls are available with either oil-break switches or air-break contactors, for induction or synchronous motors, and for single-speed or two-speed motors or motor sets.

Synchronous motor controls use the polarized field frequency method of applying excitation to the field winding of the motor in order to enable the motor to synchronize under load with maximum torque and minimum current.

Two-speed motor control can be supplied for full-voltage, reduced-voltage or part-winding starting. Push-button control is provided for either low-speed or high-speed operation, but whether high speed or low speed is to be used, the motor is always started on the low-speed connection, then transferred to high speed if that is required. This method of starting takes advantage of the lower inherent starting current inrush of the low-speed motor to minimize voltage disturbance to the power system.

The control allows transfer from low speed to high speed or vice versa at any time. Reversing is accomplished at the low speed only. The reversing and running switches are mechanically and electrically interlocked to prevent simultaneous closing.

Speeding Evaporation of Solvents in Rubber-Base Adhesives

A FOOTWEAR manufacturer was recently faced with the problem of speeding up the evaporation of solvents in a rubber-base adhesive at critical temperature to insure a lasting bond between rubber sole and cloth type shoes. The answer was found in a specially constructed conveyorized infra-red oven, utilizing eighteen 1250-watt Corona infra-red heaters using the Merco heat ray tube, for a total capacity of 22.5 Kw. The heaters, made by the Corona Equipment Co. of Glendale, Calif., were grouped six to a bank, three banks long, and formed an oven 48 inches by 12 feet.

In operation, the bonding agent is applied to both the soles and the tops with a roller coater and conveyed through the oven. After leaving the oven, operators on either side of the conveyor press soles and tops together. The end products continue to the packaging operation.

According to Corona Equipment, a stronger bond is obtained by the use of this system as controlled removal of solvents is effected and heat in the pieces continues the curing process even after assembling.

After soles and tops come through the specially constructed oven (upper right), operators press them together to form the finished product.

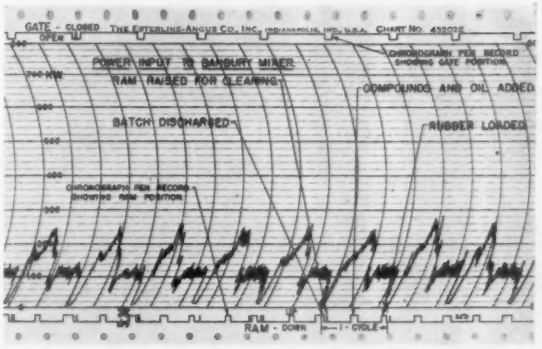
Graphic Wattmeters Operate Effectively on Banbury Mixers

LIKE many another company in the field, the Ohio Rubber Company of Willoughby, Ohio, employs a method for checking each batch of rubber that is compounded in their Banbury mixers. The company has found that the power changes in a regular fashion as various ingredients are added and as various reactions proceed during the mixing operation.

Several years ago Ohio Rubber installed graphic wattmeters, made by the Esterline-Angus Co., Inc., of Indianapolis, Indiana, on each of the motors furnishing power to its Banburys. When a formula is tested and found to be satisfactory a batch is run carefully through the mixer and a graphic recording is made of the process. The recording made at this time is used as a "master." Charts made during subsequent production runs are compared with the master chart. In the event of a discrepancy in power required or time consumed, the operator knows immediately that the batch has not been made in accordance with his instructions.

Each wattmeter has two chronograph pens, one writing in each margin of the chart. The left hand auxiliary pen records the raising and lowering of the Banbury mixer ram, which forces the material against the rolls. The right hand pen records the dump gate which discharges the batch. The wattmeter itself records the power required to masticate the various ingredients. This record shows the exact time at which each ingredient was added, the approximate amount of certain ingredients, the total mixing time, and the approximate physical characteristic of the finished batch. The record also shows any lost time between batches and thereby indicates the efficiency of use of an expensive and important piece of machinery on which the entire production of the plant depends.

Processing of the rubber in the mixer takes only a few minutes, which eliminates the possibility of obtaining a chemical analysis prior to dumping the batch. However, a sample of each batch is sent to a quality control laboratory for analysis and, in the event that the laboratory discovers a defect, the chart assists greatly in pinning down the exact cause.

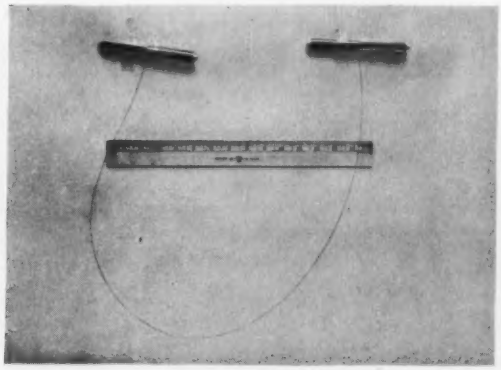


Typical chart from one of the graphic wattmeters used by Ohio Rubber to record operating characteristics of Banbury batches.

A typical chart from a Banbury mixer at the Ohio Rubber plant is depicted herewith. The upper chronograph pen shows that the gate was opened only at the end of each mix, while the lower chronograph pen shows that the ram was lowered and raised at the correct times during each batch. Use of the graphic wattmeters is said to have helped to lower rejects at the plant by catching material improperly compounded before curing when it is still salvageable. The wattmeters are relatively free from maintenance.

Wire Rubber Cutter Speeds Laboratory Compounding

THE hazards involved in cutting both natural and synthetic rubber have long been a source of injuries to the personnel in the many physical testing laboratories throughout the country. Usually, it was found necessary to have one person hold the polymer while the second person armed with a 14-inch blade rubber knife did the cutting. As often as not the blade was in need of sharpening.



Using four feet of .016 piano wire with aluminum handles at each end, smooth, even pieces of polymer may be cut to a thickness of ½ inch.

At the Government Laboratories in Akron, Ohio, a carpenter's vise was installed, and a 75-pound bale of polymer can now be held in a rigid position while a single operator cuts slices of the polymer. Five ½-inch long, metal points were welded to each holding surface of the vise to prevent slippage of the material being cut.

On a suggestion from the Copolymer Corp., Baton Rouge, Louisiana, a wire cutter consisting of approximately four feet of .016 gauge piano wire with aluminum handles at each end was tried. For cutting large bales of polymer this method was found to be far more efficient than the use of a knife. The wire is drawn through the rubber with a seesaw action. Smooth, even pieces of polymer may be cut down to a thickness of one-half inch. The wire will cut natural rubber easily but the rubber is then difficult to pull apart.

Whereas the carpenter's vise provided both safety and a time saver for all cutting operations, the wire cutter helped in the discontinuance of the use of rubber knives about 75% of the time.

Shown above is an over-all view of Du Pont's new $2,800,000 Elastomers Laboratory at Chestnut Run.

DuPont's New Elastomers Laboratory

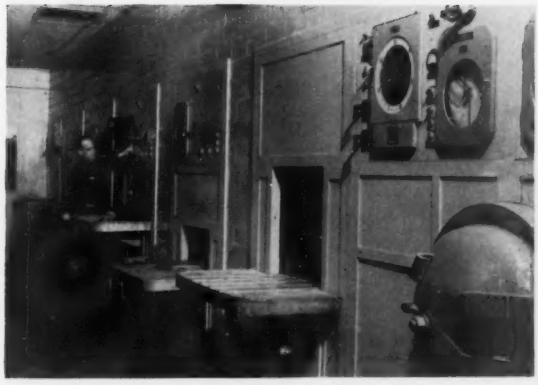
MARKING its 34th year of activity in the field of rubber, E. I. du Pont de Nemours & Co., Inc., officially opened its new product development and technical service Elastomers Laboratory on April 19. The $2,800,000 installation is the latest segment of DuPont's new technical sales service center at Chestnut Run, near Wilmington, Del. Made necessary by the company's expanding business in synthetic rubbers and rubber chemicals, the new laboratory will enable DuPont's Elastomers Division to broaden its sales service activities. In the past, these activities have been conducted at its Rubber Laboratory in Deepwater Point, N. J., one of the oldest industrial laboratories in the rubber chemicals field.

The new Elastomers Laboratory is probably the largest and most complete unit of its kind ever assembled. Designed primarily to provide technical service on neoprene, Hypalon, Hylene, and rubber chemicals, it can duplicate on a pilot-plant scale many operations in rubber manufacture. Basically, the laboratory is divided into operating and non-operating areas. Three separate conference rooms are provided. The physical arrangement of the laboratory not only permits a concentration of effort in each section but allows for closer control of all operations by the technical and operating groups.

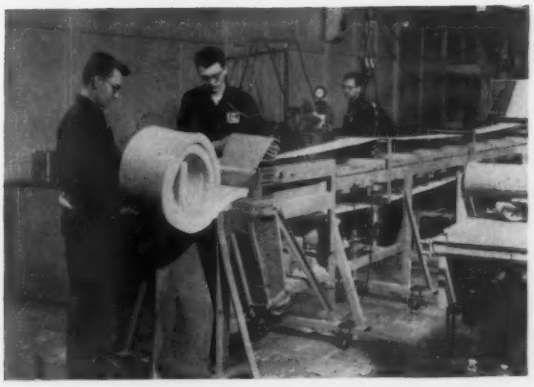
The mill room, for example, is equipped with mills, extruders, vulcanizing, compounding, mixing and related equipment. Here, activities with mechanical goods, wire and cable and colored products are concentrated. A special feature of the mill room is the color area. Completely isolated from the carbon black area of the main mill room are both the non-black and color rooms. These

The laboratory features a tire vulcanizer as part of its facilities for complete tire recapping. Units are also available for testing the finished tires.

Wire covering equipment installed in the new Elastomers Laboratory consists of payoff, extruder, capstan, takeoff, as well as a vertical vulcanizer.



A total of 10 presses make up the press line at the laboratory. The press in the foreground was designed for studying accelerated curing rates and molding.



Another unit at the laboratory is a three-roll calender with automatic takeoff which duplicates on a pilot-plant scale a normal commercial production set-up.

are independently equipped with their own mills and presses. Special lighting has been installed to permit accurate color matching.

The latex area consists of various sub-areas where evaluations are made of natural and synthetic latices in such products as dipped goods, paper, elasticized concrete, and foams. Urethane foam developments and end-product applications are conducted in still another area. The development area, complete with separate air conditioning equipment and specially designed hooded benches, provides means for a wide diversification of product activity. The applications area includes such equipment as a continuous foam table, walk-in spray booth, and a pre-polymer kettle.

Improvement of the wet strength of paper comes in for its share of development at the Elastomers Laboratory. Specimens of paper are prepared from pulp to which neoprene latex has been added. The laboratory is equipped with a special temperature and humidity controlled testing room to evaluate these specimens by TAPPI methods.

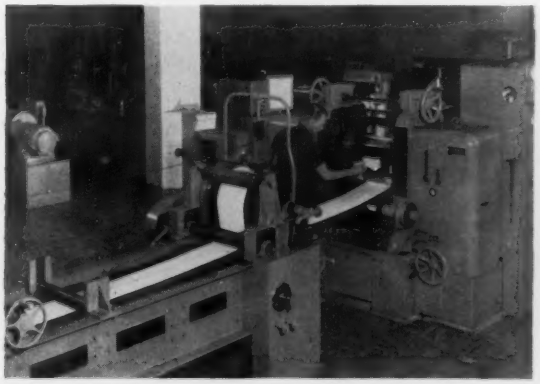
The testing area includes standard industry equipment as well as several pieces of specialized design. All types of evaluations for both new developments and finished industrial and consumer goods are conducted in this area. Included are separate sections maintained at various temperatures, humidities or other conditions.

In addition to these major areas, the laboratory operating area includes sections for quality control, storage of raw or finished materials, as well as a mechanical work shop where much of the specialized equipment is made. Complete locker facilities for operating personnel and a scheduling office are also located here.

The coatings laboratory evaluates neoprene and Hypalon solvent systems for use as protective and decorative coatings for metals, fabrics, rubber and a host of other materials. Spreading, brushing, dipping and spraying techniques are used.

As an indication of its scope, the new laboratory is equipped to manufacture tire treads, apply them to carcasses, then cure and test the finished tires. The mill room is equipped with special rubber mills on which roll speeds and ratios can be varied, and stocks may be milled at any temperature from 50 to 330°F. The new laboratory is also set up for calendering on a production line basis. A specially-built press can operate at temperatures up to 500°F. for studying greatly accelerated curing rates and high-speed melting techniques.

Located on its own site of approximately 12 acres, the laboratory contains nearly 70,000 square feet of floor space. The full-time staff consists of over 200 administrative, technical, and operating personnel. The accompanying photographs highlight only some of the laboratory's activities.



DuPont laboratory experts designed this experimental unit for the continuous manufacture of urethane foams to study production techniques.

The latest in latex processing equipment has been installed to permit small-scale manufacture of dipped goods, resilient foams, curled hair, etc.

Autogenous Extrusion

By A. N. GRAY

Assistant Superintendent, Development Engineering, Western Electric Co., Inc., Point Breeze Works, Baltimore, Md.

THE word "autogenous" is defined in Webster's dictionary as "self-generated or produced independently of external help." What is being called autogenous extrusion in this paper has been more or less broadly talked about as adiabatic extrusion. The word "autogenous" is suggested simply because it seems to be more descriptive than "adiabatic." From the definition, it should be obvious to those familiar with extruders that autogenous extrusion means extrusion without external aid in the form of heating or cooling the extruder during operation.

Autogenous extrusion may be accomplished by first designing the screw of an extruder so that it will receive material at room temperature and by using the power exerted by the drive of the screw to heat and condition the material so that it is ready for extrusion when it arrives at the exit end of the screw. A natural balance is then established which is stable with the output remaining constant.

It may be more convenient to preheat the entire machine to a temperature approximately that at which extrusion is intended to be performed. This, of course, is not necessary if one wishes to process material until sufficient heat is generated to uniformly heat the machine before beginning extrusion. This, though, would probably be obviated by the cost factor.

Some degree of autogenous extrusion can be accomplished with standard plastic extruders, but to accomplish it and gain all of its advantages, specially designed screws are necessary. To date, experimental work at Western Electric shows that it can be done with considerable advantage both in the quality and uniformity of the product and in the cost of the extrusion unit.

Before going further into the implications of this method with respect to its effect on equipment, it seems best to explain some of the reasoning behind autogenous extrusion.

Figure 1 shows a common plastic extrusion screw and a cross-section of the flight of the screw at "A". Arrows pointing both to and from this cross-section of flight indicate the direction of heat flow. Where the arrow points toward the section, introduction of heat is indicated, and where the arrow points away, heat removal is indicated. The wavy lines adjacent to the stationary barrel represent a different consistency of the plastic material in these regions under conditions which will be described.

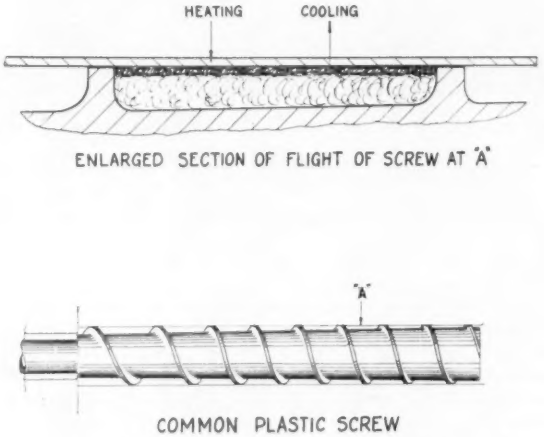


FIG. 1 — View of a common plastic screw and a cross-section of flight at one point.

Elimination of Superfluous Controls

It is commonly accepted that virtually all extruders now on the market have a somewhat elaborate system for alternately heating and cooling the machine. This is based on the mistaken idea that by such devices control is accomplished. It is possible that the machine could be so designed that it does not err and, therefore, no correction of error would have to be applied. These heating and cooling systems are expensive to manufacture. Controls are also expensive and increase the cost of installation inordinately because of the many connections necessary between sensing and heating devices and so-called control instruments. In a properly designed extruder these could be eliminated. Some simple band heaters connected with an automatic thermostat for preheating the machine before beginning operation and maintaining the desired temperature level during shutdowns would probably suffice.

Again, referring to the section of the flight shown in Figure 1, the advancement of the material through the screw is made by the frictional resistance offered by the material between the stationary barrel and the rotating screw, with the forward push being exerted by the advancing helix. Without this friction the material would not move. Now, consider heat being introduced into the machine by the external heaters around the barrel. The immediate effect is an elevation of the temperature of the barrel and a softening of the thin layer of plastic material immediately adjacent to the barrel. Obviously, if the consistency of the material immediately adjacent to the barrel is affected, the rate of movement of the material along the flight must be affected, and with this change, the rate of flow is affected. It follows then that the size of the extruded strand must change.

Conversely, if the added heat raises the temperature above the arbitrarily selected control level, after its inherent time lag, the temperature sensing device indicates that cooling is needed. At this point the controls operate and cooling begins, which temperature-wise does exactly the reverse of heat. Actually, so far as the plastic is concerned, it simply serves to again change in the

Note: This article is based on a paper given by the author at the Fourth Annual Wire and Cable Symposium. Asbury Park, N. J., December 6-8, 1955.

opposite direction the consistency of the material immediately adjacent to the inner surface of the barrel. This, in turn, disturbs the uniformity of flow of material along the flight. Alternating heating and cooling goes on indefinitely and the effects are invariably reflected in variations in the size of the extruded strand, varying up for one condition and down for the other.

Having built this deliberate error into the machines, resort then was made to size-sensing devices which, when small size is detected, brings about through servo mechanisms either a reduction in the strand speed or an increase in the worm speed to compensate. Conversely, when the size-sensing device detects oversize, it does exactly the opposite. Thus, we have a system built to make the product wrong and another system doing its best to upset the operation of the machine in an attempt to correct the errors which were originally built into it.

Let us now look at the human errors involved in the remaining adjustments and controls which are left to the discretion of the machine operator. It appears that almost universally in the plastics extrusion industry, the vital decisions which determine whether undersized or oversized products will be made are left in the hands of the man furthest removed from the management of the company—the machine attendant. Obviously, he works under certain rules and when an undersized product is found, the seriousness of the error is invariably pointed out to him. But much less attention is paid to the oversized product which is sometimes accepted as a necessary evil. However, if done often in the course of a day's work, a man may apply excess material over and above that specified which could equal several times his pay, and this can be serious. Because he is checked in all cases where the product is undersized, he will always take care that he is safely above the minimum and let somebody else worry about the excessive material used.

It can be agreed that no two machine attendants, regardless of their experience or level of intelligence, will operate a machine identically. As a consequence, every valve, switch, and control device of any sort which is subject to the attendant's adjustment is a danger point which should be eliminated. It should be the purpose of all of us, so far as possible, to engineer the operator entirely out of the process and set up his task as simply a machine attendant who feeds the material to the machine and takes away the finished product. This may seem visionary but it appears within the realm of possibility.

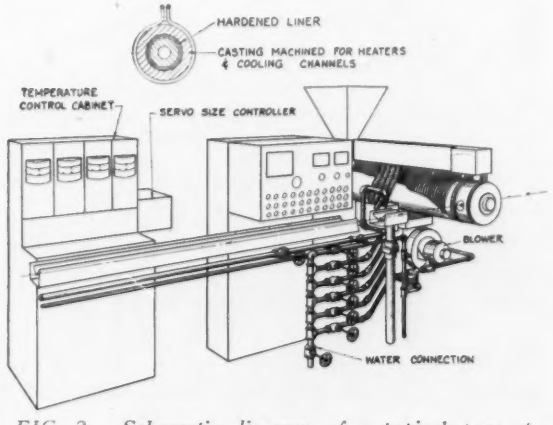


FIG. 2 — Schematic diagram of a typical present day extruder with its numerous connections.

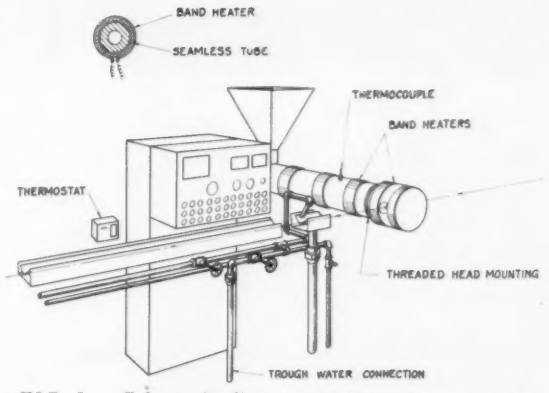


FIG. 3 — Schematic diagram of the autogenous extruder now in experimental use by Western Electric.

Carry-Over of Design from Rubber Extruders

It is appreciated that these words have a drastic implication with respect to the design, construction, and installation of plastic extruders. The carry-over of design from rubber extruders is too expensive. The composite barrel of the machine, which was necessary to accomplish cooling by circulating water, is unnecessary in plastic extruders and a simple seamless steel tube with a hardened inner surface is sufficient and less costly. The more or less elaborate heating and cooling systems are superfluous. Correctional devices would also be superfluous once the offending heating and cooling cycle is eliminated.

It is almost impossible to evaluate the difference in cost of construction or installation between an ordinary extruder (Figure 2) and an autogenous extruder (Figure 3) as it would vary considerably from manufacturer to manufacturer. However, it is obvious that this new type of equipment would be much less costly to build and install and probably more satisfactory in operation.

It would be amazing if this proposal did not arouse much skepticism. A stock answer to all skeptics at this time would be, "It is being done experimentally at the Point Breeze Works of the Western Electric Company at Baltimore, Md." Admittedly, there remains considerable work to be done, first, to develop the know-how and, second, to refine the screw and tool designs to be applicable to broad range of sizes and designs necessary for industry.

Some of the most obvious points of difference have already been encountered. One is the question of a variation in the consistency of material as fed into the machine. On the surface this appears to be a sure way to upset the perfect natural balance previously mentioned and on which depends the success of the whole procedure.

In our experimental set-up we counter this condition with a constant speed drive on the screw, that is, when it is set to run at X rpm, it runs at X rpm. Given this characteristic, naturally it must have variable torque to maintain constant speed under varying load conditions. To illustrate, let us assume that on a cold winter day some plastic material is brought in from out of doors and fed into the extruder. This would upset the operation unless some correctional device is provided. But, a correctional device is built into the unit.

If the screw persists in rotating at the same speed it must do more work on the colder material, and it will continue to do this work until the cold material is

brought to the same temperature as all preceding material. Conversely, should the material be warmer, and therefore softer, the screw continues to turn at X rpm but does less work to bring the material into the same condition for extrusion.

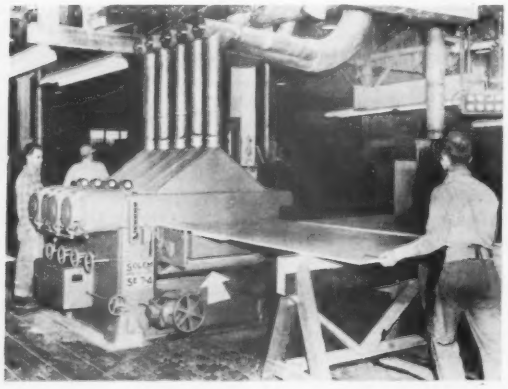
Another question which has arisen is that of heat loss through radiation from the extruder. This, perhaps, must be reckoned with, but in most factories the temperature in the neighborhood of the extruders varies from 80°F. in winter to 100°F. in summer. It is doubtful that a temperature variation of ±10°F. will upset the operation of the machines which are working at 350° to 400°F., because, as in the case of deliberately adding cold material, it matters little whether the machine works a little harder or a little less as it processes the material. As long as the rpm of the screw remains constant, the necessary amount of work, and only the necessary amount of work, will be done.

It is anticipated that numerous other questions will arise. Some of these can be answered while others are still being explored for possible answers. However, autogenous extrusion has been done experimentally with some thermoplastics and gives every indication that it will be applicable to all such materials.

Rubber Cushions Aid in Sanding Operation

A HIGHLY interesting aspect of rubber in industrial applications is its use as cushions on drum sanders to provide a modicum of yield. These machines, manufactured by the Solem Machine Co., Rockford, Ill., are used in the woodworking industries chiefly, but are also employed in rubber, leather and plastics operations. The machine has an endless bed which feeds material through the unit. Above the bed are positioned a number of sanding drums with pressure bars or platens placed between them. The traveling bed is provided with a convenient height adjustment, by means of which it may be set to sand different thicknesses of material.

The sanding drums are finely set below the platens or overhead pressure bars so they remove only a predetermined amount of material. The traveling bed is equipped with high tensile strength rubber cushions, produced by the L. M. Bickett Co., Watertown, Wisconsin, which are compounded with non-marking fillers that provide positive traction and long wear. Such fillers and pigments as titanium dioxide, silica and hard clay are used in the natural rubber compound. Long life of the cushions is assured through the use of antioxidants. Each of these rubber cushions contains a reinforcing steel insert, firmly bonded to the rubber to provide necessary strength. The metal insert is firmly embedded into a single block, which is accomplished by special molding procedures and tooling.



View of four-drum endless bed sander at the plant of Associated Plywood Division, U. S. Plywood Co., Willimina, Oregon. Rubber cushions can be seen (arrow) on the returning strand of the endless bed at the infeed end.

Form of the cushion is such as to provide a slight vacuum suction grip. Since rubber is one of the best non-slip materials known, and this slight amount of vacuum suction grip is incorporated together with a generous amount of traction surface, positive feed is assured. These treads or cushions are quite thick, resulting in longer life and less maintenance, providing almost a solid area of reinforced rubber on the bed surface.

Presence of these rubber cushions on the endless bed, which will yield to some extent under pressure, introduces a modifying and highly valuable factor with reference to sander pressure in general. As the bed is lifted, material is brought first into contact with moderate pressure against the sanding drums. As this upward movement continues, the pressure bars receive the balance of the pressure, allowing only so much to come against the drums. However, pressure may build up against the under sides of the overhead pressure bars to a point where it exceeds the amount necessary to cause a reactionary and downward yielding of the rubbers on the endless bed. Then, such yielding of the rubber cushions begins to occur.

Obviously, slight yielding of the rubber cushions is valuable from the standpoint of holding proper traction on the material (which may vary in thickness to some slight extent) and also with reference to practical gauging of the maximum amount of pressure which can be brought to bear against the under sides of the pressure bars. In other words, natural downward yielding action of the rubber cushions serves to compensate for slight differences in thicknesses of material, without making any substantial difference in actual effective pressure against the under sides of the platens.

Because this is true, the sander bed can be raised to a point where it will feed the thinnest pieces of material in a lot. One may begin sanding and get along all right for a few pieces, after which one piece will stall in the machine. Thereupon the bed can be raised very slightly to the point where it will feed the thinnest piece. Once the machine has been set to a point where it will feed the thinnest pieces satisfactorily, it will feed all the material properly. At the same time, sanding pressure against the under sides of the platens will remain practically uniform while the pressure against the sanding drums will remain entirely uniform.

The downward yielding of bed rubber cushions provides a great advantage in cases where hardwood or plywood with relatively thin faces is being drum sanded. On a roll feed drum sander, there can be no such downward yield. With an endless bed machine, there is little danger of sanding through thin face veneers.

How Pioneer Tire Company Recaps Surplus Half-Track Treads

By WILLIAM B. BROWN

BRINGING surplus half-tracks from the armed forces back to life is one of the latest achievements and special services of the Pioneer Tire Company, Inc., Tampa, Florida. The equipment invention as well as the factory-timed performance of the recapping has all been in the hands of the company's president, W. Howard Frankland. This veteran-expert tireman, with a national reputation for accomplishing almost any type of big experimental tire or rubber work, got his request from the Southern Auto Parts Co., Memphis, Tenn., reputably the world's largest surplus dealer.

With an eye to valuable export, this surplus outfit wanted to see if there was any devisable means of recapping half-tracks in the same guaranteed shape they were in when new. The Memphis company offered the job of experimenting with this recapping operation to Mr. Frankland. If his retreaded track proved a complete success through test, they would send him 35 carloads for their first paid shipment, and follow up with as many as they could buy up from the open market afterward.

Pioneer Tire developed its own compound to make a camelback strong and hard enough to meet any army specification. Within three months they had retreaded their first half-track then matched it against a brand-new rubber half-track on a testing vehicle brought into play by the Southern Auto Parts Co. When the test, designed to chug and cut any rubber to bits within 10 hours, was finished Pioneer Tire had proved to Southern Auto Parts that they had the type of recap job they wanted.

As the promised carloads of surplus half-tracks arrived and were being unloaded on a rented railroad siding (Figure 1) the ready-equipped half-track shop was made complete in a warehouse building away from the main plant. The plant was set up to work 24 hours on a rugged production schedule of 12 to 13 half-tracks a day. Three hundred half-tracks were trucked into the plant for regular factory production at the beginning. At present, storage is kept "filled-in" on the basis of two or three shipments a week.

FIG. 1—View showing some of the surplus half-tracks at the Pioneer Tire plant before recapping.

The various machines used in this recapping opera-

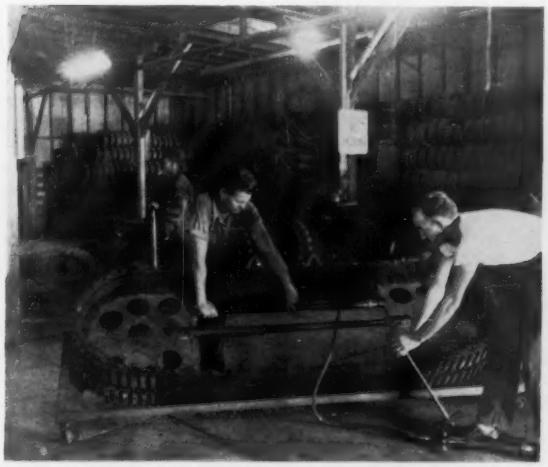


FIG. 2—Prior to recapping the half-tracks are placed on track spreaders.

FIG. 3—After the half-track is secured on the track spreader, camelback is applied to the treads.

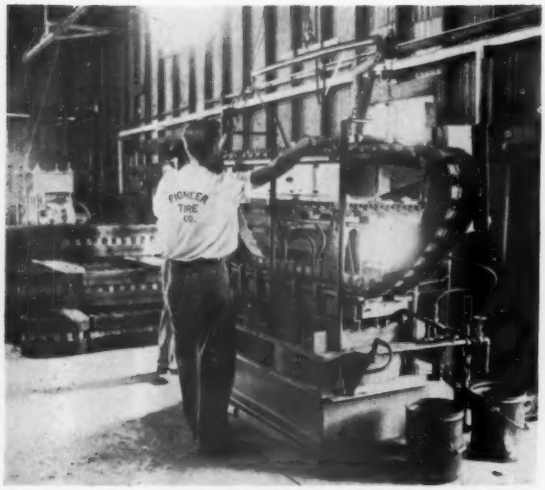


FIG. 4—In the molding operation, specially designed molds, shown above, handle each half-track horizontally.

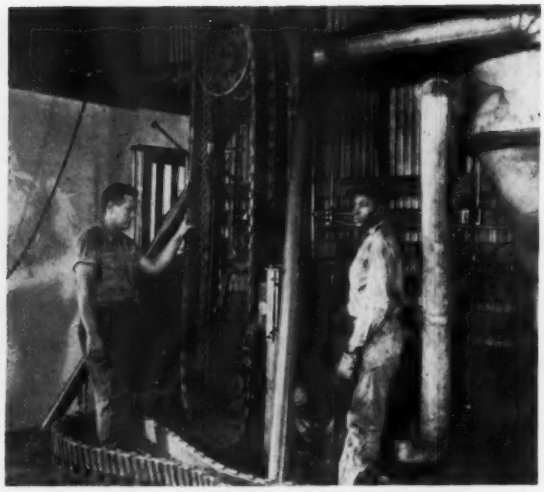


FIG. 5—After molding, the half-track is placed in a vertical position on the special type of buffing machine.

tion are of special interest. In order to handle the 500-pound pieces through the various operations, special heavy-duty hand trucks are used to take the old tracks out of production storage and bring the new retreads back. Two storage men see that fresh half-tracks are always put on the empty track-spreaders. They use "porto-power" spreading machines to fill out the tracks on each form (Figure 2). After the half-track is secured on the track spreader, camelback is applied to the track (Figure 3). All the buildup is produced through the day with two men on the camelback application.

With the camelback in place, the track is ready for molding. The specially designed molds handle five feet of half-track horizontally in four sections in an air-operated press (Figure 4). They have double matrices with army rib designs. Each mold takes five feet of the twin treads on each track and cures them at the same time.

When the half-track is recapped it is moved by overhead electric hoists to a special type of buffing machine where it is placed in a vertical position (Figure 5). The track is rotated on an overhead wheel with locking rollers against a high-powered rasp. The machine has its own dust blower and can buff each half-track in from 10 to 20 minutes.

The contract Southern Auto Parts has with Pioneer for their finished half-tracks does not specify their return to Memphis, but direct shipment from the plant to where they have been sold. The half-track shop crew got its first real injection of pride when they forwarded a shipment of recapped half-tracks amounting to more than 600 to Levi Auto Parts, Ltd., in Toronto Ontario, Canada.

Quelcor Plastisol Systems for Plant Maintenance

ANOTHER tool in the constant fight against corrosion has recently been announced by Quelcor, Inc., of Chester, Penna. Called the Quelcor Plastisol System, it is a triple package involving a polyvinyl chloride plastisol, an application techinique, and special equipment to do the job. The system is the result of long term experimentation on the part of the company.

Five specific steps are involved in the application of these newly-developed plastisols for corrosion resistance. The first step is a cleaning operation, which may take the form of sand blasting, pickling or a simple solvent degreasing, depending upon the condition of the metal to be coated. Next, an adhesive coating is applied which will insure the achievement of a good plastisol-to-metal bond.

After the adhesive coating is applied the metal is ready to receive the plastisol which may be applied to a part by either dipping or spraying. The thickness of the coating applied is a function of the temperature to which a part has been preheated or the number of times it is dipped or sprayed. After dipping the part is allowed to drain in order to remove any ungelled material. No drainage time is required for sprayed parts. The coated item is then placed in an oven, the temperature of which is accurately controlled to insure perfect fusion.

The fifth and final step covers inspection and testing. When the fusion through heat is complete, the part is allowed to cool and a rigid visual inspection is made. Following this visual inspection a spark test is used to discover the presence of any pin-holes or voids. Areas not coated to the proper thickness are revealed by checking with an electronic thickness gauge and the necessary additional plastisol is then added.

Actually, the method worked out by the Quelcor organization covers a series of in-plant systems, the specific one recommended being dependent on the chemical corrosion problems involved. Such problems are evident in plants handling rayon, staple fiber, metal plating and finishing, pickling, chlorine, caustic soda and heavy chemicals in general. The system is also applicable to materials handling equipment, marine equipment and metals refining.

Sensitive Calorimeter for Polymer Studies

A BUNSEN-TYPE calorimeter that measures very small quantities of heat precisely at room temperature has been devised by R. S. Jessup of the National Bureau of Standards. Designed for investigating the basic thermodynamic properties of high polymers, this calorimeter is particularly suited to measurement of heats of reaction, heats of solution, and heats of mixing of polymeric and other substances. It was developed in connection with a project which seeks to provide fundamental information on polymers, polymer solutions, and related materials of interest to the rubber industry.

The present calorimeter is similar in principle to previous Bunsen-type calorimeters, but it has been modified to permit the use of diphenyl ether instead of water as the calorimetric substance. In the original Bunsen ice calorimeter, designed in 1870, a heated sample was brought into thermal contact with an ice-water mixture in a closed system. Then the amount of ice melted by the sample in cooling to 0°C. was determined from the weight of mercury drawn into the system to compensate for the volume decrease in the ice-water system.

This apparatus as first devised was rather crude. However, in 1947 the Bureau developed an ice calorimeter, based on the same principle, which gave very accurate results in determinations of high-temperature specific heats and related thermodynamic data. Although the diphenyl ether calorimeter is similar in many respects to this latter ice calorimeter, it has been designed for a very different type of application.

Use of Diphenyl Ether

In measuring heats of mixing and solution, the use of diphenyl ether as a calorimetric substance has two important advantages. First, the relatively large volume changes of diphenyl ether on freezing and melting provide a sensitivity more than three times that of the ice calorimeter. Small quantities of heat can thus be measured with greater accuracy. Secondly, diphenyl ether melts at 26.87°C. This means that observations can be made at room temperature and the resulting data can be readily reduced to standard temperature at 25°C. Diphenyl ether has the further advantages of being quite stable and easily prepared in a state of high purity.

The diphenyl ether calorimeter consists essentially of a stainless steel cylindrical vessel (10 inches long, 3 inches in diameter) containing a central well deigned to accommodate a reaction vessel. The calorimeter is enclosed in an insulating jacket, and the intervening space is evacuated. The central well is made of stainless steel pipe to which is soldered a brass bottom. This pipe extends upward through the brass top of the cylindrical vessel to an opening in the outer insulating jacket.

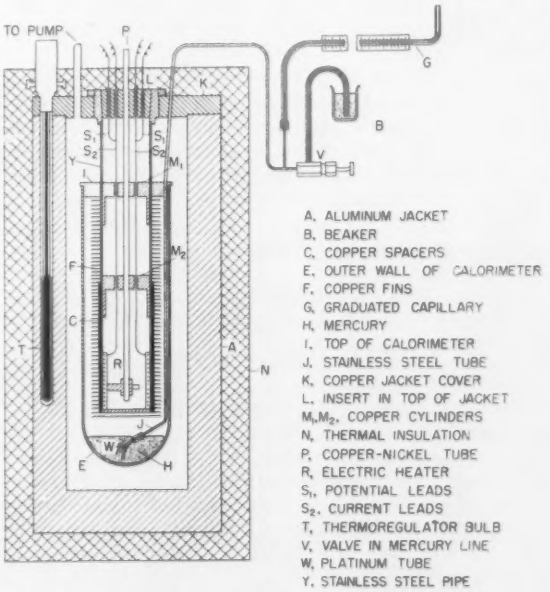
The space between the central well and the stainless steel calorimeter vessel is filled with purified diphenyl ether except for a pool of mercury in the bottom of the calorimeter. When the calorimeter is in use, the outer surface of the central well is covered with a mantle of solid diphenyl ether, which is in turn surrounded by liquid diphenyl ether. Heat transferred between the central well and the diphenyl ether causes partial melting or freezing, with a consequent change in the volume of the diphenyl ether and a flow of mercury into or out of the calorimeter through tubing which leads to an external mercury reservoir.

The quantity of heat is measured either by the volume or the weight of mercury thus transferred. If the volume of mercury is small, heat input is measured by the displacement of a mercury meniscus in a graduated glass capillary. If the mercury volume is large, heat input is determined from a combination of the change in weight of the mercury reservoir (a small beaker of mercury) and the change in position of the mercury meniscus.

Calibration of Apparatus

Because the mercury capillary is horizontal, changes in the position of the mercury meniscus do not affect the pressure on the diphenyl ether in the calorimeter. To reduce any possible effect of changes in barometric pressure on the position of the meniscus, the open end of the capillary is connected to a 1-liter flask immersed in oil in a Dewar flask. The pressure in the system is adjusted to atmospheric at the beginning of an experiment and remains practically constant during the time of an experiment. When only the mercury capillary is used to determine the volume of mercury moved, the mercury reservoir is closed off from the system by means of a needle valve.

To improve thermal contact between the central well and the diphenyl ether, copper fins are soldered to the outer wall of the well. These fins also serve to support



Schematic drawing of the Bunsen-type calorimeter designed at the National Bureau of Standards for measuring very small quantities of heat in polymer studies.

the solid diphenyl ether, which is denser than the liquid. Copper spacers between the fins at the lower end of the well promote uniformity in the vertical distribution of heat transferred between the well and the diphenyl ether outside it.

An electric heater wound around the outside of the calorimeter is used to control the rate of freezing of the diphenyl ether before the beginning of an experiment. Too rapid freezing of the diphenyl ether causes entrapment of gaseous air. The freezing is carried out by bubbling air through water in the central well.

The insulating jacket is made of an aluminum cylinder with a copper cover and is surrounded by cork insulation. The jacket is maintained at the temperature of the calorimeter within $\pm 0.001°C$. by means of a thermoregulator. A 10-junction copper-constantan thermocouple measures the temperature difference between the top of the calorimeter and the jacket cover. Aluminum-foil radiation shields within the evacuated space between calorimeter and jacket aid in reducing thermal leakage from the calorimeter.

Once the calibration factor of a Bunsen-type calorimeter is known, the amount of heat energy added to the calorimeter can always be computed directly from observations on the mercury system. The diphenyl ether calorimeter was calibrated by electrical heating, using a 100-ohm electric heater in the central well in place of a reaction vessel. From the known electrical energy input and from observations of the mercury system, a calibration factor of 79.10 joules per gram of mercury was obtained. In 1947 Ginnings, Douglas, and Ball obtained a value of 270.46 j/g of mercury for the ice calorimeter. The sensitivity of the diphenyl ether calorimeter is thus about 3.4 times that of the ice calorimeter. In general, the Bureau's studies show that the Bunsen-type diphenyl ether calorimeter can be used to measure quantities of heat of the order of 38 calories with a precision of about 0.05 percent.

Calimar—The Picture-Forming Plastic

FLEXIBLE film in which deep photographic images are developed by heat is made with vinyl resins by a new process with wide possibilities in fields such as decoration, display and photo-recording. Known as Calimar, this picture-forming plastic was developed by the Ferro Chemical Corporation, Bedford, Ohio, under sponsorship of the U. S. Army Signal Corps.

Calimar consists of an organosol paste based on Bakelite vinyl resins and containing light-sensitive, dye-forming, and catalytic chemicals. In one modification, this mixture is ball-milled for 20 hours, then drawn down on a supporting backing to form a photosensitive film which, when dried and cured, is three-thousandths of an inch thick and self-supporting. Exposed through a photographic negative to ultra-violet light and developed by heating, the film bears a continuous tone photographic image extending clear through from top to bottom surfaces.

The depth of this image, combined with the resistance of vinyl resin-base film to wear, moisture and chemicals, produces a photographic reproduction with unusual durability. The image is also resistant to sunlight bleaching. In moderately heavy film, the deep image produces a three-dimensional effect.

Applications of the Material

These qualities fit Calimar, for example, for production of decorative film, bearing durable, continuous tone photographs or patterns, instead of half-tone, surface decoration obtained by conventional printing processes. Durability of the photo-decorated film also makes it useful for reproducing maps, blueprints and line drawings. Bakelite vinyl resin-base film will not ordinarily take pen or pencil markings, but it accepts grease pencil marks that rub off when no longer needed. Wear-resistant license plates and floor tile, individual display signs, and personalized items of wide variety may be produced with the new material. Based on the same material, a photo-bearing identification card of Calimar film laminated between sheets of clear rigid vinyl sheet is virtually tamper-proof.

Unlike conventional photographic materials, Calimar contains no costly silver compounds, and film made of this paste is photosensitive throughout, rather than merely on the surface. Its speed of action is comparable to that of lithographic plates. In contact with a standard photographic negative, Calimar film is exposed to ultra-violet light for about one minute. This light frees radicals from chlorinated paraffin, and the radicals activate metal oxides and dye formers in the film.

How Plastic Film Is Developed

Inserted in a hot-air oven or infra-red heater, the exposed film is developed by heating it evenly for about six minutes at 320°F., or less time at higher temperature. Heat must be kept within a range of about 5° across the film. Heating causes light-activated compounds in the film to form dyes, and at the same time it passivates any dye formers not yet catalyzed as a result of the light. Thus, the photographic image is formed through the entire thickness of the film, which is easily peeled off its backing on removal from the heater.

Long strips of decorated Calimar film could be produced in present heat installations for curing plastisol-organosol film coatings. Exposed through an endless negative or stencil, freshly drawn film would be simultaneously developed and cured for uses such as curtains and wall covering.

Present Calimar images are warm brown in tone. Methods of obtaining true blue-black, and possibly colored, images are being investigated. The film itself may vary from translucent to opaque, with or without tinting colors, and, in addition, it may vary widely in flexibility.

Development work has been chiefly with films cast from Bakelite vinyl resin-base organosols. However, solution types can be used to compound picture-forming lacquers, and even paints may be possible. Instead of forming pictures, the light-formed catalyst may also be used to modulate surface tension properties caused by wetting agents susceptible to catalytic degradation, according to the manufacturer. For other applications, conductivity or other properties of the substance may be modulated by light exposure.

Calimar organosol paste based on Bakelite vinyl resins is available now for experimental purposes, according to the manufacturer.

Editorials . . .

President's Report

IN ACCORDANCE with the Synthetic Rubber Facilities Disposal Act of 1953, President Eisenhower has made a report to Congress covering the resources and requirements of the domestic rubber manufacturing industry. The report, submitted to Congress on April 30, was actually based on a detailed study of the over-all situation by an inter-agency ad hoc committee appointed by Arthur Flemming, Director of the Office of Defense Mobilization. The key finding of the report was that there will be plenty of rubber available for United States consumers in the foreseeable future.

In brief, President Eisenhower emphasized three specifics in the report: (1) He recommended that the government's last synthetic rubber facility—the research laboratory at Akron—be disposed of; (2) He urged that research grants to universities and private organizations be incorporated in the general program of fundamental research, rather than be spelled out for rubber; (3) He rejected a recommendation from the National Science Foundation that the government consider taking special measures to spur industrial development of the so-called synthetic natural rubbers, the *cis*-polyisoprenes. There is something to be said on either side for these three recommendations.

Where the Akron laboratory is concerned the chances are it will be offered for sale after June 30. In recommending such sale, NSF states that the facilities "are no longer unique" and any company interested in the work now being performed "will have only temporary difficulty in arranging for such work elsewhere." These are true statements, but the synthetic rubber industry as such will lose its opportunity to have a basic, fundamental laboratory devoted to monomer and polymer research, the results of which are available to the entire industry. There is no special reason why the government should continue to underwrite the costs of a fundamental laboratory of this kind for a specialized industry, but it is to be regretted that a synthetic rubber organization or association has not been formed which might have been in a position to take over operation of the Akron facilities. From where we sit, the Akron laboratory is in a perfect position to continue furnishing fundamental data on the synthetics. Incidentally, some ten companies have expressed interest in the purchase or lease of the facilities.

As far as the method of handling research projects is concerned, the recommendation contained in the report is somewhat academic. The present government-sponsored research projects on synthetic rubber cost approximately $1,000,000 annually. Under the plan advanced by the National Science Foundation these special projects would be replaced by the Foundation's basic program. The amount expended within the basic program for research devoted to the molecular structure of synthetic rubbers would be left to the discretion of NSF officials. It might be more or it might be less than $1,000,000 a year. Obviously, the major change would rest in the type of research rather than in the cost factor. Some changes would also be made in the method of handling the projects and in making the results available.

With regard to the rejection of the suggestion advanced by NSF that consideration be given to federal support in the development of the *cis*-polyisoprene rubbers, the President had several comments to make. In the first place, he indicated that there was no immediate problem involved from the national security viewpoint because of the existence of the natural rubber stockpile and the highly developed synthetic rubber industry. Secondly, government could rely on private industry to get the new rubbers out of the laboratories and into commercial production. Finally, the government has at its disposal several means of assisting industrial development and expansion where and when necessary to national security. The rejection was made despite the warning contained in the ODM report that large scale commercial production of the isoprene-based rubbers could not possibly occur within the next few years.

In this instance we are in complete agreement with the President's reasoning, although the existence of a government-sponsored or an industry-sponsored fundamental laboratory would probably hasten the end result. At the minute four companies have made public announcement of the development of *cis*-polyisoprene rubbers—Firestone, Goodrich, Goodyear and Phillips Chemical. Two of these companies have announced plans for the construction of pilot plants geared for semi-commercial production. Competition will dictate the first full-fledged commercial plant. This plant may be constructed sooner than ODM contemplates. Because of the importance of these new rubbers to national security as a possible complete replacement for natural rubber in truck and other heavy-duty tires, any of these companies, or any of the other major companies which have not yet disclosed their developments in this field, could probably secure a Certificate of Necessity to hasten commercial production.

There is an interesting conjecture hidden in the ODM report and the President's comments. In the long run, if the *cis*-polysioprene rubbers prove themselves capable of completely replacing natural rubber for truck tires and other products which still call for such usage will there still be a need to maintain the natural rubber stockpile? If and when such a point is reached, what disposition will be made of this stockpile? We do not wish to add to the current problems of the rubber producing areas, but it is an interesting question.

Highlights Sidelights *of the News . . .*

May, 1956

At the bid deadline, midnight, April 19, two bids had been received for the government-owned alcohol-butadiene facility at Louisville, Ky. . . . One of the bids was from the present operator, Publicker Industries, Inc., while the other was from the Union Carbide and Carbon Corp. . . . The Disposal Commission has entered into negotiations with the bidders and the recommended sale or lease will have to be approved by the Attorney General and the Congress (page 295).

Thermoid Co. and four former officials have been indicted by a Federal Grand Jury in New York City on charges of filing false and misleading statements for 1951 through 1953 with the New York Stock Exchange . . . The complaint charges the defendants did not report as taxable income a total of $625,276 . . . The indictment also charges that the company and the four individuals conspired with eleven others, who are not defendants, to defraud the U. S. in collection of income taxes (page 296).

The battle between the present management of the Seiberling Rubber Co. and Edward Lamb, Toledo, Ohio, industrialist, came to an end on April 23 at the company's annual stockholders' meeting . . . The present management won eleven of fifteen seats on the board of directors capturing 71.5% of the shares outstanding (page 297).

Sweeping changes in the top-level management of the Goodyear Tire & Rubber Co. have been announced with P. W. Litchfield relinquishing his authorities and responsibilities as the company's chief executive officer . . . President E. J. Thomas now becomes top ranking officer of the concern . . . Mr. Litchfield was chief executive officer of Goodyear for thirty years (page 301).

Three leading tire manufacturers and three major oil producers have denied Federal Trade Commission charges that they are restraining trade through their contracts for the promotion of tires, batteries and accessories . . . Next step in the FTC hearings will be a session before an examiner who will rule on the complaint . . . The companies have the right to appeal the examiner's decision if they so desire (page 303).

A Commerce Department official estimates that the government realized a profit of $22,500,000 on the sale of the government's synthetic rubber facilities to private industry . . . An 8.6% profit was claimed on $262,000,000 which the government spent to construct and operate the plants . . . Total revenue from the sale of the plants (excluding Louisville) was $284,800,000 (page 295).

NEWS REPORTS and Industry Activities

TWO OFFERS RECEIVED FOR BUTADIENE PLANT; PROFIT ON PLANT SALES PUT AT $22,500,000

THE Rubber Producing Facilities Disposal Commission reports that two bids have been received offering to purchase the government-owned alcohol-butadiene plant at Louisville, Ky., and two bids have been received for the equipment at Baltimore, Md., used in the manufacture of a catalyst for the production of butadiene. As of the bid deadline, midnight, April 19, Publicker Industries, Inc. of Philadelphia, Penna., and Union Carbide & Carbon Corp., New York, N. Y., tendered bids for the alcohol-butadiene facility. Publicker is the present operator of the plant under a three-year lease which went into effect in April, 1955. This company, with its bid, also submitted an alternate proposal calling for a long-term lease. Union Carbide is a former operator of the facility.

Purchase bidders on the catalyst equipment were Publicker and Davison Chemical Co., owner of the Baltimore, Md., plant in which the equipment is located. Davison, a division of W. R. Grace & Co., offered to lease the equipment if a sale cannot be negotiated. The equipment at Baltimore has not been in use since August, 1952, and the government has been paying storage charges. Negotiations began immediately and will extend for a thirty-day period. Any recommended sale or lease of either the alcohol-butadiene plant or the catalyst equipment must be approved by the Attorney General and the Congress.

In a recent address before the Akron Rubber Group, Assistant Secretary of Commerce Frederick H. Mueller stated that an estimated $22,500,000 profit had been made on the sale of the government's synthetic rubber plants to private industry. Mr. Mueller claimed an 8.6% profit on $262,000,000 he said the government spent to construct and operate the facilities. Total revenue from the disposal of the facilities, he said, was $284,800,000.

This figure does not include expected revenues from the sale or long-term lease of the Louisville alcohol-butadiene plant or from the catalyst equipment located at Baltimore, Md.

Cites Book Value Figures

Mr. Mueller said the $284,800,000 worth of facilities carried a book value of only $127,600,000, plus an accumulated deficit of about $134,600,000 for the entire period of government operation. This figure, he added, included losses from sales of seventeen plants prior to 1953. The official estimated that private business bought the recently sold plants at prices which are yielding $1.08 for every dollar of remaining invested capital.

"These are anything but 'giveaway' prices," he asserted, "particularly when the record is compared with 56c on the dollar for the valuable styrene plants sold in 1947, and 35c on the dollar for the neoprene plant in 1949".

It is also reported that there is good news in the form of a 75-page report which has reached President Eisenhower's desk in recent weeks. This report sums up the findings of a committee appointed last fall by Defense Mobilizer Arthur Flemming to examine rubber's present status and to plot its course for the next five years. (See page 307 for late news on the report).

According to preliminary reports on the committee's findings, it is held that synthetic rubber producers expect to increase capacity by 25% by late 1957—to 1,700,000 long tons a year. The report also states that the government's natural rubber stockpile can see the United States through a five-year war. Another point made is that private industry research will soon permit an end to government-supported work on new applications.

Also in the news in recent weeks is the recent action by the Secretary of Commerce to cut red tape for American traders who want to ship non-strategic items to the Soviet Union and her European satellites. Secretary Weeks explained that the new rules, which include some rubber products, do not apply to exports to Communist China and North Korea on which the U.S. has a total embargo.

"The new arrangement," said Mr. Weeks, "will broaden opportunities for increased trade by providing U.S. exporters with a roster of peaceful goods which will not require the granting by the Commerce Department of individual, specific licenses for shipment to the Soviet bloc." He also said the action is in line with the President's objective announced at Geneva last July "to create conditions which will encourage nations to increase the exchange of peaceful goods throughout the world."

Other news relative to the rubber industry during the past period came from a House Armed Services subcommittee which heard testimony from Army officials on the subject of the government's tire test program at San Antonio, Texas. The Army officials stated that this program will be closed down in September of this year. Back in 1953, the subcommittee recommended that this program be ended because it competed with privately-owned companies.

Surveys Tire Inventories

Speaking of tires, a recent survey conducted by the "Journal of Commerce" indicates that tire manufacturers, in general, do not feel that current conditions in the industry warrant cutting back production. The survey found that inventories of tires in the hands of manufacturers have been rising. It is expected that sales of replacement tires will exceed last year's by only a modest percentage. Trade sources believe that automobile production (and as a result, original equipment sales) may decline as much as 15%.

Three factors are said to contribute to tire industry reasoning, which discount the conclusions that might be drawn from the inventory figures themselves. First, sales of replacement tires were abnormally high in the early part of last year, because of anticipated price increases. Second, inventories have to be higher this year, because of increased tire types. Third, the inventory problem may be further explained by the anticipated introduction of the 14-inch wheel on 1957 automobiles. This calls for large stocks of present tire types.

GRAND JURY INDICTS THERMOID AND FOUR FORMER OFFICIALS

Thermoid Co., Trenton, N. J., and four former officials have been indicted by a Federal Grand Jury in New York City on charges of filing false and misleading financial statements for 1951 through 1953 with the New York Stock Exchange. Those indicted are: Frederic Schluter, former chairman and president; George S. Fabel, also a former president; Russell H. Temple, former treasurer, and Robert R. Stevenson, former comptroller. None of these is now an official, although Mr. Schluter owns or controls an estimated 11.7% of Thermoid's outstanding voting stock, according to the company's proxy statement for the May 1, 1956, annual meeting.

A representative of the U. S. District Attorney's Office said the indictments were the result of an audit of Thermoid's 1954 operations ordered by present directors. The indictment, returned April 13, charges that the four defendants "unlawfully, willfully and knowingly" filed false and misleading statements relating to net income and income tax provisions during the three years. The complaint charges the defendants did not report as taxable income a total of $625,676—$89,959 of this in 1951, $129,118 in 1952 and $406,599 in 1953.

The grand jury further charges that from September, 1952, and continuously thereafter up to the filing of the present indictment, the company and the four individuals unlawfully, willfully, and knowingly conspired with 11 others who are not named as defendants, to defraud the U. S. in collection of income taxes.

Names Co-conspirators

Among those named as co-conspirators are Edgar N. Noel, Willis B. Oram, Lawrence Ingerman and others. The complaint alleges that during the course of the alleged conspiracy the defendants and co-conspirators "would manipulate, destroy and improperly alter the books and records and prepare false invoices and other documents" of the company and its subsidiaries. The subsidiaries include Essex Rubber Co., Trenton, N. J.; Thermoid Western Co., Nephi, Utah; Asbestos Manufacturing Co., Huntington, Ind., and Fiber & Metal Products, Inc., Downey, Calif.

As a further part of the alleged conspiracy, the defendants and co-conspirators would prepare and file false income tax returns with the Internal Revenue Bureau in New Jersey, Indiana, and California, the complaint charges.

The four former Thermoid officials, as defendants, face five years' imprisonment and $10,000 fines if convicted on the conspiracy charge and two-year sentences and $10,000 fines if convicted on the other three counts.

Mr. Schluter said, "This news is a shock and a surprise. Apparently former officers of the Thermoid Co. have been indicted for alleged activities in relation to inventory manipulations which took place in the accounting department of the company. The Government seems to believe that this activity involved some violations of Securities and Exchange Commission regulations. There is no claim that any officer of the company profited one penny from these activities. The whole thing was an internal affair as to which I disclaim any personal responsibility."

"When all the facts are brought out," he said, "I am confident that I will personally be completely vindicated." Mr. Schluter served as president of Thermoid until September, 1952, and was chairman until August, 1955, when he resigned shortly after Warren Hill was elected president.

The 1954 annual report cited bookkeeping "manipulations" in the previous three years. The 1954 annual report was signed by two directors of the company rather than the chairman and president, the usual procedure.

Hill Offers Comment

Mr. Hill said in commenting on the indictment, "I have not had the opportunity to read the indictment. None of the persons indicted is now associated with the company and none of them has been associated with the company since the new management was elected to office on August 30, 1955."

The company's principal production units include two plants at Trenton, plus manufacturing units at Charlotte, N. C., Huntington, Ind., and Nephi, Utah.

Present management in its proxy statements lists nine nominees for directors. These are Mr. Hill, Hans A. Eggerss, Ray Lawson, Robert H. Robinson and Harold T. Youngren, incumbents, and Elton W. Clark, W. Stuart Landes, Bert W. Martin and James L. Spencer, who are new nominees. Present directors who are not nominees are Willard H. Allen, Herbert R. Ryker and William S. Weeks.

Blowout preventers used on oil well drilling rigs to seal off the area between drill pipe and casing at the surface now employ Hycar sleeves.

Correction on the Acushnet Process Company for the 1955-56 Rubber Red Book

Several important changes in the Executive Personnel of the Acushnet Process Company, of New Bedford, Mass., occurred between the time of securing data for the 1955-56 RUBBER RED BOOK and actual publication of that edition. Accordingly, in the interest of accuracy, we are listing the data as it should have appeared. It is suggested that the following listing be clipped out and pasted over the one which now appears on Page 11 of the 1955-56 RUBBER RED BOOK.

Acushnet Process Co., Belleville Ave., New Bedford, Mass. (Phone: New Bedford 3-1711).

Est. 1910. Employs 1300.

CORPORATE OFFICERS: Chairman of the Board and General Manager of the Golf Division, Fred W. Bommer; Pres., Richard B. Young; Vice-Pres. & General Manager of the Rubber Division, Karl P. Goodwin; Vice-President in Charge of Production, T. C. Weaver; Treas., Mrs. F. M. Stewart; Asst. Treas., A. Hawes; Controller, W. E. Flack; Director of Purchases, William J. Roemer; Purch. Agent, Charles R. Hinkley.

RUBBER DIVISION: Sales Mgr., Holmes M. Dyer; Tech. Director, T. C. Edwards; Plant Engr., F. Bieringer. *Products:* Molded Rubber and Synthetic Rubber Parts and Products.

GOLF DIVISION: Asst. Mgr. & Sales Mgr., William Bommer; Fact. Mgr., C. Saunders; Tech. Mgr., Stanley Szulik; Chief Chem., Leon Keches; Chief Engr., Lynde Williams. *Products:* Golf Balls.

Ro-Search Affiliate Opens

What is reputed to be the most modern and attractive footwear factory in South America has recently been completed by "CIPE", a Ro-Search affiliated manufacturing firm in Guayaquil, Ecuador. Designed along ultra-modern lines, it features such modern conveniences as a swimming pool for the employees. It was constructed at a cost of $270,000. H. W. Rollman, president of the Wellco-Ro-Search organization states, "I have seen practically every rubber and footwear factory in every country throughout the world during the last 25 years, and in my opinion, this is one of the finest I have ever seen." The factory will start production during the next few weeks, with an initial daily production of 2,000 pairs of all types of Wellco-Ro-Search footwear. Distribution will be handled through a staff of exclusive sales representatives. Once the training program has been completed under the supervision of technicians from the United States, only Ecuadorian personnel will be employed.

Dollinger Joins Ferro Chemical

Appointment of J. H. Dollinger as sales manager of vinyl stablizers, has been announced by the Ferro Chemical Corp., Bedford, Ohio. Mr. Dollinger will direct the vinyl stablizer sales program, on a national basis, to the vinyl plastic industry. A graduate of Brooklyn College in chemistry, Mr. Dollinger also attended the management and marketing course at the Graduate School of Business Administration, New York University. He is a member of the American Institute of Chemists, American Chemical Society, Salesmens Association of American Chemical Industry and American Oil Chemists Society. Mr. Dollinger was formerly sales manager of Glyco Products Co., Inc. of New York, N. Y.

SEIBERLING RETAINS CONTROL; TAKES 11 OF 15 BOARD SEATS

The battle between the present management of the Seiberling Rubber Co. of Akron, Ohio, and Edward Lamb, Toledo, Ohio, industrialist, ended with the company's annual stockholders' meeting on April 23 in Akron when the present management won eleven of fifteen seats on the board of directors. The final count from the balloting at the meeting gave the Seiberling management 296,699 shares, or 71.5% of the shares outstanding. Mr. Lamb got 98,950 shares. Not voting were 19,267 shares.

When the hotly-contested proxy battle began, Mr. Lamb proposed a slate of eight directors for the board, which was then composed of nine members. On April 23, however, stockholders approved a Seiberling-sponsored proposal to increase the board to fifteen members, and then proceeded to vote in eleven Seiberling directors.

The new board's management members are J. P. Seiberling, president; H. P. Schrank, vice-president in charge of production; C. E. Jones, vice-president and controller; A. C. Blinn, former chairman of the Ohio Edison Co.; H. E. Paige, president of the First National Bank of Akron; L. M. Seiberling, vice-president in charge of sales; R. J. Thomas, vice-president and treasurer; P. T. Sweeny, vice-president of Snow, Sweeny & Co., New York investment firm; W. P. Seiberling, secretary; Paul A. Frank, president of the National Rubber Machinery Co.; and L. M. Buckingham, Akron attorney.

The Lamb group consists of Mr. Lamb; M. H. Pendergast, president of the Maumee Machine Tool Co.; J. Howard McGrath, former Attorney General of the U.S., and Frank C. Oswald, an associate of Mr. Lamb's.

At a press conference following the election of directors, Mr. Lamb stated: "I am happy to be a member of the Seiberling board. All I ever wanted was for the company to become an active aggressive competitor in its field. This contest has benefited all stockholders."

Lamb Addresses Stockholders

On April 26, Mr. Lamb addressed a letter to stockholders of the Seiberling company in which he stated: "We are very happy to communicate with you as new Directors of the Seiberling Rubber Company. Most of all we want to thank you for the very cordial way in which we were received by the stockholders. As you know, J. Howard McGrath, Frank C. Oswald, M. Harrison Pendergast and the undersigned were chosen to serve on your Board for the ensuing year.

"The first formal meeting of your board is scheduled for May 17th, 1956 at 2:30 P.M., in the offices of the company. We hope to present some constructive suggestions at this first meeting in order that your company may be expanded and diversified. This will be the first meeting in which the new group will participate and we are most anxious that our offers of cooperation will be cordially received. We are especially anxious that your company's research and new product divisions may be substantially enlarged. We hope to see the sales promotion vastly expanded. Most of all we hope that the problem of Seiberling's lack of working capital may be resolved in a firm fashion to the end that your company be put among the leaders of this industry.

"We, of course, will keep you advised of developments at the directors' meetings, and we hope to send reports to you from time to time on results obtained by your directors and other employees.

"In behalf of my associates, I extend thanks to you for giving us the privilege of serving on your Board of Directors."

EMERY INDUSTRIES ANNOUNCES FORMATION OF TWO NEW SALES DEPARTMENTS

G. William Boyd

Robert F. Brown

Sparked by the multi-million dollar expansion in research and plant facilities of Emery Industries, Inc., Cincinnati, Ohio, K. K. Boyd, vice-president in charge of sales and purchases, has announced the formation of two new sales departments to replace the present single chemical sales operation. This new line-up will provide better and more expert technical help to the many industries served, Mr. Boyd explains. It will bring related product lines into closer alignment and make possible even better technical sales attention for new products and old products alike.

Robert F. Brown, for nine years the sales manager of Emery's present Chemical Sales Department, will head up one of the new sections, with Robert Hull and Vern Colby as assistant sales managers. This new group, called the Organic Chemical Sales Department, will handle the sales of all non-fatty Emery products. Included are azelaic and pelargonic acids along with plasticizers, esters and diesters including those designed for special lubricants, polymerized (dimer) acids, textile processing oils as well as Twitchell emulsifying bases, Emery states.

G. William Boyd, for the last nine years sales manager of Emery's rapidly growing Sanitone Division, has been named sales manager of the new Fatty Acid Sales Department. In addition to Emery's standard fatty products and stearic and oleic, all animal and vegetable fatty acids, hydrogenated fatty acids and glycerides, and derivatives of caster oil will be handled by this group.

New H. O. Canfield Subsidiary

H. O. Canfield Co., Bridgeport, Conn., has announced establishment of a new subsidiary, Wabash Rubber & Plastics Corp., in Seymour, Ind. The subsidiary will start production of plastic items for the appliance and automotive industry in June at a 15,000-square-foot plant now under construction. The plant will cost about $250,000 and will employ about 100 persons, the announcement said.

Withdraws from Ink Business

United Carbon Co., of Charleston, West Va., has announced its decision to withdraw from the manufacture of printing inks, which it has been carrying on through Charles Eneu Johnson Co., Inc., a wholly-owned subsidiary. The decision was dictated by the necessity of replacing the main Johnson plant at Philadelphia. This would have meant a large additional investment, which did not seem warranted by prospects for profit. Interchemical Corp. of New York is purchasing United Carbon's inventories, formulas and trademarks, and taking over United Carbon's contracts and employes.

Borden Buys Resin Industries

Borden Co., New York, N. Y., has acquired the Resin Industries of Santa Barbara, Calif. The newly acquired company produces industrial vinyl insulation sleeving and tubing, vinyl and polyethylene medical grade tubing, plastic garden and agricultural hose and irrigation tubing. Resin Industries will be operated as a wholly-owned subsidiary of Borden.

AKRON UNIVERSITY REPORTS ON NEW RUBBER RESEARCH INSTITUTE

Additional details on the new Institute of Rubber Research organized by the University of Akron at Akron, Ohio, have now become available. As stated in the April, 1956, issue of RUBBER AGE, the new Institute will carry on extensive work in rubber research. Dr. Maurice Morton, who has been serving as director of rubber research and professor of polymer chemistry, has been named director of the Institute.

Akron University states that the Institute of Rubber Research is an outgrowth of a half century of teaching and research in rubber chemistry. From the time that the late Dr. C. M. Knight introduced the world's first course in rubber chemistry in 1908, there has been a steady growth of interest and activity in this field. The late Dr. Hezzleton E. Simmons, before assuming the presidency of the University in 1933, was also active in continuing and expanding this work, in his capacity as Professor and head of the Chemistry Department.

In 1943, under the impetus of the U. S. Government synthetic rubber program, a more substantial research program was started under the direction of Dr. G. Stafford Whitby, who also became the first Professor of Rubber Chemistry at the University. Since 1953, and in keeping with the rapid technological developments in synthetic elastomers and polymers there has been a continued expansion in rubber and polymer research, under the direction of Dr. Morton, who became the first Professor of Polymer Chemistry. These activities finally culminated in the establishment of the Institute.

Engaged In Basic Research

The Institute is engaged in basic research in the field of natural and synthetic rubber, and related polymers. Its main purpose is the advancement of knowledge in this vital area of science, with a concomitant aim of providing a training ground for future scientists in this field. This work is financed by grants from foundations, government agencies and industrial concerns, as well as from contracts for research studies from government and industry.

The scope of this research covers the chemistry and physics of polymers in general, and elastomers in particular. Activities include the synthesis of new polymers, characterization of molecular structure, and relation of molecular constitution to physical behavior. Thus the Institute has a project, supported by the U. S. Air Force, which is concerned with kinetic measurements of the extent of the branching reaction in addition polymerization. Another contract, with the U. S. Army Signal Corps, supports an investigation of the mechanism of degradation of condensation polymers; while a third project, under contract with the Office of the Quartermaster General, has as its objective the synthesis of new types of silicone elastomers. Other investigations are concerned with such widely varied problems as mechanism of emulsion polymerization and effect of vulcanizate structures on physical behavior.

Dr. Maurice Morton

New director of the Rubber Research Institute at the University of Akron.

The wide scope of these investigations is an indication of the manner in which the rise of the synthetic rubbers has brought the whole science and technology of rubber into the broader field of polymer science. For this reason there is a growing need for more fundamental knowledge to keep pace with the rapid development of new synthetic elastomers. Much of this type of knowledge can best be pursued under academic conditions.

The facilities of the Institute consist of both chemical and physical laboratories, all of which are located in Knight Chemical Laboratory on the campus. In addition to the usual equipment which is expected in laboratories devoted to polymer chemistry, such as osmotic pressure and light scattering apparatus, electron microscope, etc., the Institute is unique in possessing the necessary rubber processing and testing equipment required for the evaluation of the physical behavior of elastomers. This includes laboratory rubber mills, Banbury mixers and vulcanization presses, as well as standard testing equipment for tensile strength, resilience, abrasion, etc.

Present Staff Outlined

The present staff of the Institute consists of about 20 full-time technical personnel, including research chemists and physicists and technical assistants. In addition, several holders of graduate fellowships, sponsored by industry, are also engaged in the research projects being carried on by the Institute, and several senior undergraduates are given an opportunity to assist in this research, as part of their training.

In addition to its research activities, the Institute also assists the University in its graduate program in polymer and rubber chemistry. Some of the Institute staff members are also on the teaching staff of the Department of Chemistry, which offers a wide variety of post-graduate courses in this field. Thus, full-time or part-time members of the staff may also be pursuing graduate degrees by means of their research work. The Institute also offers an interesting program of research for post-doctoral studies, which attracts scientists from all parts of the world.

As part of its interest in providing further training in this field, the Institute also co-operates in sponsoring special courses and seminars together with the Chemistry Department, for technical personnel in the rubber and allied industries.

To Double Acrylonitrile Output

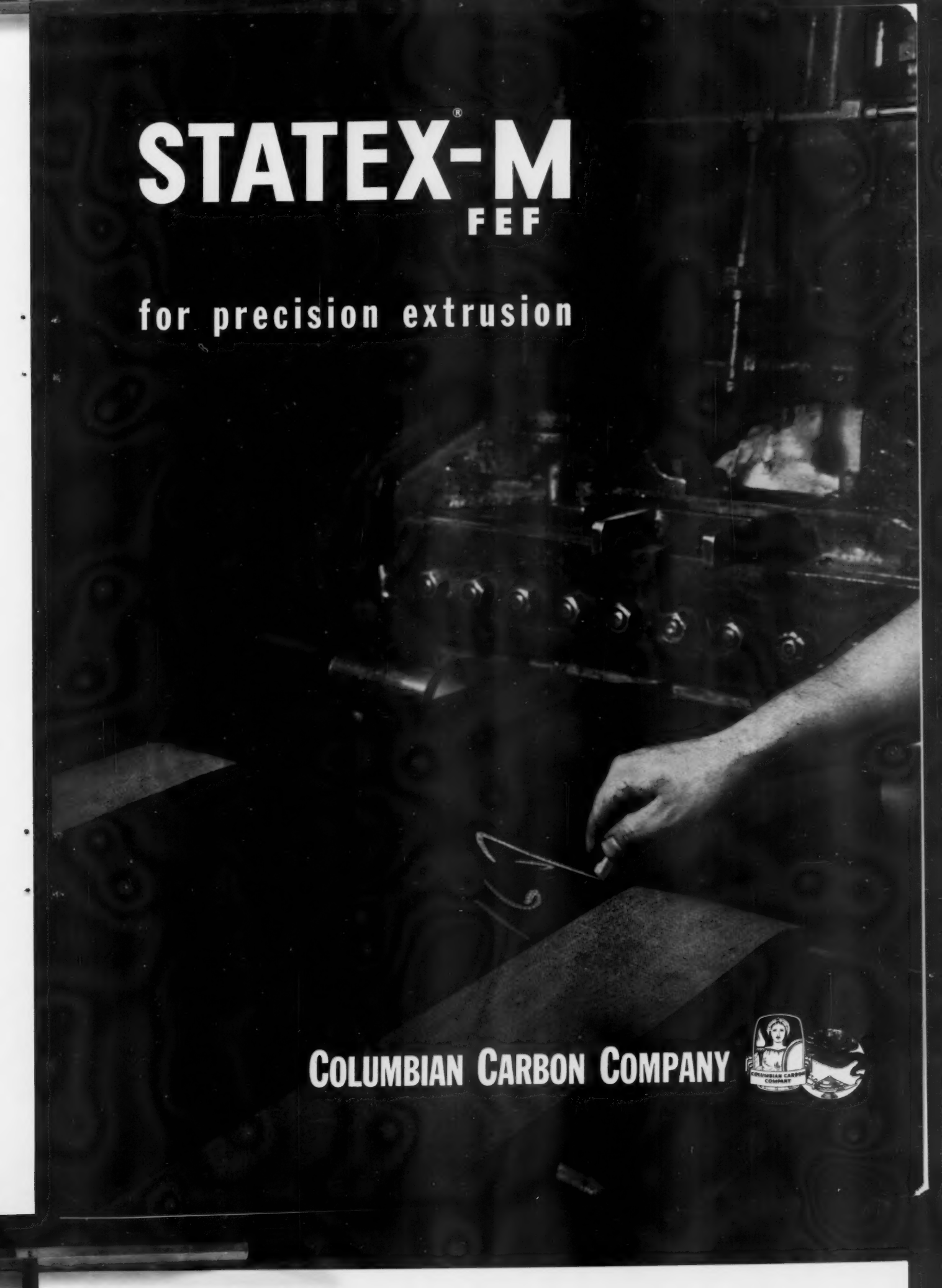
American Cyanamid Co., New York, N. Y., has completed the first phase of its expansion of the Fortier plant near New Orleans, La., which, when finished, will provide facilities to double the production of acrylonitrile. The new facilities, which include the capacity for making other chemicals for thermoplastic molding compounds and synthetic rubbers, will be built in successive stages with completion scheduled for 1958. American Cyanamid Co. has also announced negotiations for the transfer of Chemical Construction Co., a subsidiary, to Electric Bond & Share Co. If the transfer is effected, Chemical Construction will continue to serve American Cyanamid and other clients in the chemical industry. American Cyanamid has set up its own engineering and construction service, headed by General Anthony C. McAuliffe, retiring commander in chief of U.S. Forces in Europe.

Sets Up New Development Labs

Arizona Chemical Co., New York, N. Y., has announced the establishment of a new process development laboratory at Panama City, Fla. In keeping with the steady growth of its business in products manufactured by distillation of tall oil and sulfate turpentine and future expansion of plant facilities, the laboratory will carry out process development work, and work in cooperation with the Stamford, Conn., laboratories of the American Cyanamid Co., where exploratory research work will continue as heretofore in the direction of new products to be made from Arizona's basic raw materials. Arizona Chemical is jointly owned by American Cyanamid and the International Paper Co.

Britain Plans Feedstock Plants

It has been announced in London that Britain will build two feedstock plants to save the country around $30,000,000 a year in imports. The plants, which should be operating by 1958, are to be erected at the giant Esso oil refinery at Fawley near Southampton. They will produce butadiene, a petroleum gas, which will be fed into a new $14,000,000 factory being put up on an adjacent site by Dunlop's International Synthetic Rubber Co. Output will provide 50,000 tons of synthetic rubber a year—about the volume of present imports from the United States.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SEVERAL MANAGEMENT CHANGES ANNOUNCED BY GOODYEAR TIRE

Sweeping changes in the top level management of the Goodyear Tire & Rubber Co. were announced on April 3 by the company. P. W. Litchfield, chairman of the board, is relinquishing his authorities and responsibilities as the company's chief executive officer and turning them over to President E. J. Thomas, who becomes top ranking officer of the company. Mr. Litchfield will continue as chairman of the board and will serve on various management committees.

President Thomas immediately announced the creation of three new executive vice-presidencies. They will be filled by R. S. Wilson, sales; P. E. H. Leroy, finance and accounting, and R. DeYoung, production, personnel, research and development. Mr. Thomas also becomes chairman of the newly created Policy Committee which is made up of the three executive vice-presidents, Mr. Litchfield, H. L. Hyde, who is vice-president and chief counsel, and L. E. Spencer, who will serve as secretary to the committee.

Three of Goodyear's younger executives have been advanced to positions as vice-presidents of the parent company. They are Victor Holt, Jr., who has been vice-president of the subsidiary sales company in charge of tire renewal sales, L. E. Spencer, who has been assistant to the president, and F. J. Carter, who has been director of personnel.

These changes plus other realignments were announced by Messrs. Litchfield and Thomas at a meeting on April 3 of Goodyear executives held in Goodyear Theatre. They were authorized by the board of directors of the company which met April 2.

Retirement during the coming month of June has been announced by two vice-presidents, J. M. Linforth, in charge of manufacturers' and government sales, and F. W. Climer, in charge of industrial relations. Mr. Thomas paid warm tribute to Messrs. Linforth and Climer at the April 3 meeting, saying that their requests for retirement were made some time ago and reluctantly accepted by the company in deference to their wishes.

C. C. Gibson, manager of original equipment and government sales, and P. K. Coe, manager of the company's Detroit office, have been advanced to vice-presidencies of the subsidiary sales company, the Goodyear Tire & Rubber Co., Inc.

P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., clasps hands with President E. J. Thomas as the authorities and responsibilities of the chief executive officer of the company pass from the one to the other. Gathered in Mr. Litchfield's office for the historic picture are, left to right, Vice-President H. L. Hyde, and the three men who fill newly created executive vice-presidencies, P. E. H. Leroy, R. S. Wilson and Russell DeYoung. Mr. Litchfield was chief executive officer of Goodyear for 30 years and is serving his 51st year on the board of directors.

General Tire Expands Division

The General Tire & Rubber Co., Akron, Ohio, has announced a 50% expansion of the General Metal Products Division in Cuyahoga Falls, Ohio. The expansion, resulting from the acquisition of the Dougherty Machine Division of Fawick Corp., an adjacent property, will enable General Metals to increase its rate of production of special rubber machinery, tools and dies, molds for rubber and plastic materials, aircraft wheels, and industrial wheels and hubs. Under the terms of the purchase agreement, General Metal Products acquires the entire assets of the Dougherty Division.

Borg-Warner Plans Expansion

Borg-Warner Corp., Chicago, Ill., plans to spend approximately $25,000,000 for expansion of its facilities this year, according to an announcement by Roy G. Ingersoll, chairman and president. This outlay is almost double last year's expenditure of $13,000,000 and brings to approximately $157,000,000 the funds the corporation has paid out for these purposes since the end of World War II. Most of the 1956 expansion funds will be allocated to three projects. One is the new $10,000,000 chemical plant of the Marbon Chemical Division in Washington, West, Va. The Byron Jackson Division has under construction a new electronics plant and laboratory in Santa Ana, Calif. A multi-million dollar research center is being erected in Des Plaines, Ill. In addition to these domestic projects, the construction of a new $11,000,000 plant of Borg-Warner, Ltd., at Letchworth, England, is being financed in Great Britain.

Northern California Group Meets

Seventy-five members and guests attended the Northern California Rubber Group meeting held April 12 at the Berkeley Elks Club, Berkeley, Calif. Guest speaker for the evening was William Winter, radio and television personality, who discussed "News Behind the Headlines." His talk included a political coverage of the Far East rubber-producing countries, as well as the Near East, Arab, Israel, and Egyptian areas. The meeting also honored past-presidents of the Northern California Rubber Group, who are as follows: Halsey Burke (Burke Rubber), Joseph W. Hollister and Ross E. Morris (Mare Island Naval Shipyard), William D. Good (American Rubber Mfg.), John B. Watson and George B. Farwell (Goodyear Rubber) and Lynn Shaeffer.

Develops Truck Rim Treatment

A new and exclusive treatment of truck rims that gives over-all protection against corrosion from water, road salts and abrasion has been developed by the Firestone Steel Products Co., Akron, Ohio, according to an announcement by L. J. Campbell, company president. "The new perma-plating process has been adopted by the company after more than three years of laboratory experimentation with epoxy resins", Mr. Campbell says. "Another outstanding feature of perma-plated truck rims is the uniformity with which the resinous material covers and protects them at every point. In the previous zinc electroplating process, it was impossible to deposit zinc, in uniform thickness, on both the rim flange and base. In the epoxy resin dip, the viscosity of the coating and the speed of withdrawal from the dip tank guarantees uniform coverage at every point. Exhaustive laboratory and road tests have proved perma-plated truck rims to be superior in tests for salt spray, humidity, water immersion, sulfurous and sulfuric acids, calcium chloride and abrasion resistance", Mr. Campbell states.

Plans Iraq Rubber Plant

Burke Research Co. of the United States has opened negotiations for a new plant to be built near Baghdad that will be initially designed to meet half of Iraq's synthetic rubber requirements. A detailed outline of a project to produce GR-S type synthetic rubber from petroleum has been submitted through the Iraq embassy. Burke has offered to construct and operate the new unit. The plant could later be expanded to meet all of the country's requirements, with any surplus going to Mideastern markets.

DETROIT GROUP AND WAYNE U PLAN NEW RUBBER LABORATORY

Representatives of Wayne University and the Detroit Rubber & Plastics Group initiated a campaign to raise $25,000 for the university's new Rubber Technology Laboratory at a luncheon meeting at the Engineering Society of Detroit on April 3. Feature of the meeting was the presentation of a check for $1,000 to Wayne University representatives by officers of the Detroit Rubber & Plastics Group. Accepting the gift on behalf of the university were Dr. A. R. Carr, Dean of the College of Engineering, and Dr. H. G. Donnelly, head of the Department of Chemical and Metallurgical Engineering. H. W. Hoerauf (U. S. Rubber), chairman, and W. F. Miller (Yale Rubber), treasurer of the Detroit Rubber Group, made the presentation.

The gift will supplement an existing rubber laboratory equipment fund of $3,500. Wayne University is making available additional money from its departmental equipment fund and will defray all expenses of equipment installation.

Announces $25,000 Goal

Speaking for the Detroit Rubber & Plastics Group, R. W. Malcolmson (DuPont), chairman of the Educational Committee, expressed confidence that the $25,000 goal would be met with the combined assistance of the rubber industry and of Detroit area industry to which continued advances in rubber technology are important. Contributions toward this goal can be made payable to Wayne University, attention of Detroit Rubber & Plastics Group (Laboratory Fund) and sent to: W. F. Miller, Treasurer, Detroit Rubber & Plastics Group, Inc., c/o Yale Rubber Co., 3530 West Fort Street, Detroit, Mich., for transmittal to Olin Thomas, vice-president for finance, Wayne University.

The new laboratory will supplement the rubber technology lecture courses which have been sponsored by the Detroit Rubber & Plastics Group in cooperation with Wayne University for the past several years. During this time, nearly 600 men, both from rubber manufacturing and rubber consuming industries, have taken these courses.

The opening of the new laboratory is scheduled for the fall semester of 1956. The laboratory program was prepared by qualified technical men from the rubber industry working with the staff of Wayne University's College of Engineering. The laboratory is to be equipped with all necessary processing and testing equipment, and designed for broadening and expansion of the program as funds become available. The course will consist of nine integrated experiments conducted over a 16-week period. It will be given one evening a week for three hours.

Leading the campaign for the Detroit Rubber & Plastics Group is Mr. Malcolmson, assisted by E. M. Chmiel and J. A. Mickey also of the Education Committee.

Vaughn Anniversary Observed

The 100th anniversary of the Vaughn Machinery Co., Cuyahoga Falls, Ohio, was marked on April 11 at the annual Chamber of Commerce dinner held at the Chesterfield Hotel in Cuyahoga. More than 250 persons attended the dinner which honored company officials. Vaughn Machinery is the direct successor to a partnership formed on April 18, 1856. Early in 1857, James A. Vaughn, grandfather of the present chairman of the board, entered the partnership. The firm now manufactures wire drawing machinery and equipment which is sold in nearly every country in the world. The present officers include L. A. Vaughn, chairman of the board; his son, James A., who became president in 1954; another son, Gordon, who is vice-president in charge of manufacturing; and a third son, Allan, who is secretary. L. A. Vaughn, his three sons, Lisle M. Buckingham and Allan Johnson constitute the present board of directors.

Michigan Re-Elects Officers

At the annual organization meeting of the Michigan Chemical Corp., St. Louis, Mich., on April 20, the board of directors re-elected Theodore Marvin, president and chairman of the board; Fred A. DeMaestri, vice-president; R. J. Knapp, secretary and treasurer; and Josephine M. Curtiss, assistant secretary and assistant treasurer.

Dean Carr of Wayne's College of Engineering is shown here accepting a $1,000 gift for the new laboratory from W. F. Miller, treasurer of the Detroit Rubber & Plastics Group. Seen left to right are: H. G. Donnelly, head of Chemical Engineering Dept., Dean Carr, W. F. Miller, H. W. Hoerauf, chairman of the Detroit Group.

BUFFALO GROUP HEARS MAYOR SPEAK ON ORDERED POLYMERS

The Buffalo Rubber Group held its Spring Meeting on March 7, at the Hotel Westbrook in Buffalo, N. Y. The meeting featured a talk on "Preparation and Properties of Ordered Polymers" by R. H. Mayor, head of the new Polymers and Polymerization Methods Section, Goodyear Tire & Rubber Co., Akron, Ohio. Following the technical portion of the meeting, a dinner was held, after which Jack N. Miller, Republic Steel Corp., spoke on the St. Lawrence Seaway Project.

Dr. Mayor, in his paper, observed that during the past year or so, information has been accumulating on a new class of polymeric materials. Today, the frequency of these reports has increased to such an extent that it appears that something in the nature of a revolution is at hand in certain branches of the plastics industry and possibly in the rubber industry as well.

For the most part, this new development had its origin in the work of Karl Ziegler of the Max Planck Institute, and Giulio Natta of the Milan Institute. In brief, the new class of polymers results from controlling the propagation reaction by conducting the polymerization on a solid surface. This leads not only to rapid conversion and high degrees of polymerization, but also to a more regular special arrangement of the individual monomer units in the polymer chain, he declared.

Cites Ziegler Catalyst

The Ziegler catalyst, prepared by reacting an aluminum alkyl with a salt of one of the elements of the titanium, vanadium, or chromium families, polymerizes ethylene at atmospheric pressure. The polymer produced has higher molecular weight and less branching than conventional polyethylene. Because of this, the new polymer is denser, harder, stronger, and higher melting.

Natta has used this type of catalysis on substituted ethylene (propylene, butylene, styrene, etc.). In polymers of these olefins, every other carbon atom is unsymmetrically substituted, and thus is capable of dl isomerism. Natta has been able to prepare polymers having, at least for long segments of the polymer chain, the same configuration on all of these unsymmetrical atoms. Such polymers are highly crystalline and are denser and stronger than conventional polymers of similar composition.

Goodyear and Goodrich, Dr. Mayor said, have indicated that this type of catalyst can be adapted for the conversion of isoprene to tree-like rubber. Firestone has effected this conversion using a lithium metal catalyst. From the reports presented at the last Rubber Division Meeting, Dr. Mayor concluded that the Firestone "Coral" rubber and the Goodrich "Ameripol SN" are essentially equivalent to each other, and that for practical purposes, both are equivalent to natural Hevea rubber.

Comprehensive information regarding design and materials used in the manufacture of custom-built cylinders is contained in a new bulletin published by the Oilgear Co., Milwaukee, Wisc. Ask for Bulletin 79000.

TIRE AND OIL COMPANIES DENY RESTRAINT OF TRADE CHARGES

Three leading tire manufacturers and three major oil producers have denied Federal Trade Commission charges that they are restraining trade through their contracts for the promotion of tires, batteries and accessories. B. F. Goodrich Co. and Texas Co., Goodyear Tire & Rubber Co. and Atlantic Refining Co., and Firestone Tire & Rubber Co. and Shell Oil Co. asserted the contracts are lawful and proper means of competition.

The F.T.C. last January said that the oil producers in return for "overriding" commissions, contract to influence their controlled service stations and distributors to buy the tires, batteries and accessories sold by the tire manufacturers with whom they have contracts. The companies conceded there are contractual arrangements, generally referred to as sales commission plans, but said they are "fair and lawful methods of waging and meeting competition", according to the F.T.C.

Atlantic said "many . . . economic realities explain and justify (its) interest in the purchase . . . of superior quality accessories by . . . dealers who handle" its products. For example, Atlantic said it must see that these stations maintain an accessory line competitive with that of other modern service stations. The "endorsement, sponsorship, and active support of one or more" sources of supply, Atlantic added, is the "only economically feasible alternative" either to manufacturing these items or acting as a wholesale distributor.

Firestone said, according to the F.T.C., that the growing trend of the "one stop" outlet of petroleum products and accessory items led to its adoption of the sales commission plan; "to accomplish lawful competitive objectives, keep abreast of the marketing of only its standard brand Firestone tires . . . ".

Next step in the proceedings will be a session before Hearing Examiner Earl J. Kolb of F.T.C., probably in May or June. If Mr. Kolb should rule against the companies, they have the right to appeal to F.T.C.'s board of commissioners. If the commissioners likewise rule against the companies, appeal may be taken to Federal Court.

French Polyethylene Plant

Plans for building a commercial plant for the production of a new family of superior plastics have been announced by Societe des Usines Chimiques Rhone-Poulenc, Etablissements Kuhlmann and Compagnie Francaise de Raffinage (C.F.R.). These firms will together work under the license which was recently granted by Phillips Petroleum Co. to Rhone-Poulenc for the exclusive use in France of the Phillips-developed process for making rigid polyethylene. The plant will be located on a site adjacent to the C.F.R. Refinery at Gonfreville near Le Havre, Normandie. Feedstocks for the ethylene production will be supplied by C.F.R. from its Gonfreville refinery.

Goodyear Advances Pauley

R. E. Pauley

R. E. Pauley has been named general manager of the Foam Products Division of the Goodyear Tire & Rubber Co., Akron, Ohio. He will be responsible to president E. J. Thomas, assisted by and in coordination with J. E. Mayl, subsidiary vice-president in charge of films, foam and flooring. Mr. Pauley has been a member of Goodyear since 1935, starting in belting sales. He moved to Dallas, Texas, as industrial products clerk, then went to Cleveland as industrial products representative. In 1943, he won the Litchfield medal as the company's best wholesale salesman. He later became industrial products district manager at Pittsburgh. Before being assigned to the Foam Products Division, he was in charge of sales at the plant at St. Mary's, Ohio.

General Tire Re-Elects Officers

The stockholders of the General Tire & Rubber Co., Akron, Ohio, unanimously re-elected all 16 directors at the annual and special meeting held recently in Akron, Ohio. J. A. Andreoli, executive vice-president of the General Tire & Rubber Export Co., was promoted to a vice-presidency of the parent company at the annual directors meeting, which followed the stockholders meeting. The stockholders also approved an amendment to the Articles of Incorporation to revise provisions of the 71,093 shares of cumulative preferred stock outstanding and approved a revised retirement program for salaried employees to include a profit-sharing plan. The stock issue received a 98% favorable vote and the retirement plan was approved by a 97.9% vote.

Tarbox Appointed Representative

Glyco Products Co., Inc., Empire State Building, New York 1, N. Y., has announced the appointment of Thomas C. Tarbox as technical sales service representative for the southeastern states. Mr. Tarbox was formerly connected with the sales divisions of the Dewey and Almy Chemical Co. and the Esso Standard Oil Co. He received his B.S. in Chemical Engineering from Syracuse University.

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GOODRICH PLANS $200,000,000 FIVE-YEAR EXPANSION PROGRAM

At the recent annual meeting held by the B. F. Goodrich Co., Akron, Ohio, John L. Collyer, chairman of the board, reported that the company plans to spend $200,000,000 for expansion during the five-year period, 1956-60. The new money will come largely from retained earnings, he added.

On the outlook for the rubber industry, President William S. Richardson, said "we now estimate that world consumption of total new rubber for the year 1956 may be slightly higher than in 1955, reaching possibly 2,995,000 long tons, although we believe consumption in the U. S. will be about 6% lower than in 1955 by reason of the drop in estimates for new passenger car production and sales."

"The drop in consumption in the U.S.," Mr. Richardson said, "will be in the usage in crude rubber. The total man-made rubber consumption in the U. S. is expected to be slightly higher. The percentage of man-made to total usage in the U. S. should be up from 58½% in 1955 to 62% in 1956."

Mr. Richardson said the sale to Goodrich-Gulf Chemicals, Inc., which is jointly owned with Gulf Oil Corp., on February 21 of the Government's big synthetic rubber plant at Institute, West Va., made B. F. Goodrich "the largest owner in the world of man-made rubber capacity."

He added Goodrich-Gulf Chemicals was currently turning out synthetic rubber "at an annual rate of 120,000 long tons" compared with the plant's rated capacity of 90,000 long tons a year when the company took it over from the Government.

Mr. Richardson said Goodrich-Gulf Chemicals will put a pilot plant into operation in late May or June to produce a new type of synthetic rubber company scientists discovered last year and that is claimed to be the equal of natural crude rubber in every respect.

Mr. Richardson stated the new synthetic has been named Ameripol S-N (the S-N stands for synthetic-natural) and that the pilot plant's output will be used to "carry out exhaustive tests to verify earlier tests and to develop the necessary engineering knowledge for any full scale production plant it may be considered sensible to build."

U. S. Rubber Appoints Higgins

U. S. Rubber Co., New York, N.Y., has announced the appointment of Edward J. Higgins as assistant general manager of its International Division. He succeeds Fred S. Carpenter, who is retiring after nearly 43 years of service. Mr. Higgins, formerly assistant to L. C. Boos, vice-president and general manager of the division, became associated with the International Division in 1944 as a technical representative. He was named director of manufacturing and development four years later, and in 1953 he became division director of staff operations. A chemical engineer, Mr. Higgins joined U.S. Rubber in 1935 as a development engineer at the Fisk tire plant in Chicopee Falls, Mass. He later transferred into manufacturing as a process engineer and then as a member of production management supervision.

A.I.E.E. RUBBER AND PLASTICS SUBCOMMITTEE HOLDS AKRON CONFERENCE

The Rubber and Plastics Industries Subcommittee of the General Industry Applications Committee, American Institute of Electrical Engineers, held its 8th Annual Technical Conference on April 9 and 10 at the Sheraton-Mayflower Hotel in Akron, Ohio. The meeting featured the presentation of a number of interesting papers, each paper being followed by prepared discussions.

The keynote address was delivered by W. E. Chope, president of the Industrial Nucleonics Corp. Featured speaker at the banquet, held in the evening on April 9, was W. S. Wolfe, factory manager of domestic operations, Goodyear Tire & Rubber Co., who spoke on "The Changing Rubber Business".

The Akron Section of A.I.E.E. acted as host to the meeting. The committee on local arrangements included: *Secretary-Treasurer,* W. J. Backus (Clark Controller); *Registration and Printing,* H. R. Kronenberger (Square D); *Sound and Discussion Recording,* F. E. Palmer (General Tire); *Photography and Projector,* G. P. Siddall (Goodyear), and *Hotel Arrangements, Menu and Entertainment,* Pat Goodall (A-C Supply).

Abstracts of the papers presented at the two-day conference follow herewith:

In his paper on "Cypak—A new Concept in Industrial Control," P. G. Hanna (Westinghouse) stated that with the increased growth of automation in industry in recent years, reliability and versatility of the control systems are of prime importance and are becoming the governing factors in the design of automatic control. Cypak control devices were developed to fill the need in industry for highly reliable digital control systems. These devices are magnetic static switching circuits that essentially perform the same functions as relays but have no moving parts, the author stated.

Delivers Paper on Safety

"Designing Safety into Electrical Controls" was the title of the paper presented by Gregory DiCaudo (Goodyear). This paper briefly covered the problems of control voltage, positive safety circuits and safety features available in d-c control. The major portion of the paper was based on the problem of time involved in setting up a safety circuit. This problem was analyzed with respect to a wound rotor plugging type high voltage controller for a mill line.

William Deans (Circuit Breaker) in his paper on "Coping With Short Circuit Currents in Low Voltage Systems" stated that short circuit current can be coped with as is, by using adequate interrupting devices. It may also be reduced through purposely inserted reactance, in various ways consistent with acceptable voltage regulation. Interrupting devices include circuit-breakers, fuses, current limiting fuses, and coordinated breakers and current limiting fuse combinations, he stated.

The next portion of the meeting featured a symposium on "Training of Personnel for Maintenance of Electric and Electronic Equipment" moderated by H. Warren Roose (Wallace Clark). Panel members included Harold G. Thomas (Firestone); Al Sabo (Ohio Rubber); Rolland T. Radcliffe (General Tire) and Robert L. Williams (Reliance). During the discussion it was pointed out that the increasing complexity of electrical and electronic controls is making maintenance and trouble-shooting increasingly difficult, to the point where some industries are hesitant about installing new equipment having any degree of complexity. Problems, and possible solutions, encountered as a result of this situation were discussed by the panel, all of whom are working closely with management, training programs, maintenance personnel, and equipment, in both large and small plants.

Contaminated Atmosphere

E. L. Smith (Firestone), in presenting his paper on "Symposium on Problems of Equipment Operating in Contaminated Atmospheres", stated that the physical properties of the new motor insulations developed in the last few years are showing great promise as possible solutions to problems with large motor failures caused by the penetration of carbon black dusts and plasticizer vapors. A variety of superior materials such as the polyesters, epoxy resins, irradiated polyethylene and silicone rubbers are now available for installation in new and rebuilt motors, he said. Properties of these new materials and the special techniques required for application to motor windings were discussed by the author.

"The Growing Impact of Industrial Standards on Processes and Safety" was the title of the paper presented by W. P. Curtis (Ford Motor). In presenting this paper Mr. Curtis stated that industries which have made an effort to standardize on requirements have accumulated history over a number of years, which can be of significance to other industries. This paper related some of the difficulties involved in setting up industry standards or recommended practices, and described results which are being obtained.

Also at the conference, A. G. Seifried (B. F. Goodrich), presented his paper on "Requirements of Regulators for Selected Applications". He said that the present day record-breaking production in the rubber manufacturing industry and plastics materials output, is due largely to outstanding improvements in automatic regulator design applications. Proper selection of regulating systems for each application is the key to maximum performance efficiency which affects product quality, quantity and economy of equipment costs. Applications of machine drives with amplidyne, magnetic amplifier, rotating and electronic regulating equipment were presented.

Dielectric Heating Cited

Another of the papers, "Recent Developments in Dielectric Heating", was presented by W. H. Hickok, (Girdler). The paper covered briefly the evolution of types of circuits used from the early applications of dielectric heating to the present. New applications have become practical due to circuit improvement. The improvements were considered in detail, especially in regard to large high power equipment. Several circuit diagrams were shown as well as graphs depicting the improved efficiencies associated with the circuit improvements.

Other papers presented at the meeting included "Silicone Rubber Motor Insulation" by J. L. Kuehlthau (Allis-Chalmers); "A New Insulation for Rubber Mill Service" by Henry E. Mazanek (General Electric); and "The Use of Epoxy Resins for Insulating Electronic Motors Operating in Severe Service Environments" by Henry L. Lee (Epoxylite).

RD Establishes New Committee

The formation of a new Publications Committee has been announced by the Division of Rubber Chemistry of the American Chemical Society. The new committee is headed by Norman Bekkedahl of the National Bureau of Standards, Washington 25, D.C., as chairman, and includes David Craig (Goodrich Research) and R. G. Seaman (*Rubber World*). It will make a survey of the currently available books dealing with rubber science and technology and will make recommendations to the Division regarding the need for new writings in order to bring the literature up to date. Among the possibilities which the committee will discuss are these: (a) should the Rubber Division publish a handbook on rubber technology; (b) an elementary text; (c) an advanced text; (d) a revision of Davis and Blake's "Chemistry and Technology of Rubber"; (e) a series of monographs on certain subjects. A progress report will be made to the Division at the May meeting in Cleveland. Mr. Bekkedahl would like to receive comments or suggestions from members of the industry on this score.

Join National Polychemicals

National Polychemicals, Inc., Wilmington, Mass., has announced two appointments to its technical staff at the firm's Wilmington plant and laboratory. Roy D. Perdue, Jr., has been assigned to the position of project engineer. Mr. Perdue, a graduate of Yale University, was formerly a project engineer at the Springfield Armory, Springfield, Mass. Prior to that he had been associated with Nauset Laboratories, Barret Division of Allied Chemical and Dye Corp., and Baker Castor Oil Co. Joseph H. Murphy has joined National Polychemical's research and development group. A graduate of Bradford Durfee Technical Institute, he obtained his Master of Science degree at the University of Cincinnati. Mr. Murphy came to National Polychemicals from the Process Research Division of the Esso Research and Development Co. National Polychemicals has recently completed two new plant units at its sixty-acre Wilmington site where it manufactures chemicals for the rubber, plastics, and related industries.

DUNKEL ADDRESSES PHILADELPHIA ON COMPOUNDING BUTYL RUBBER

The April 13th meeting of the Philadelphia Rubber Group held at the Poor Richard Club in Philadelphia, Penna., attracted approximately 140 members and guests. Speaker for the meeting was Dr. Walter L. Dunkel of the Enjay Laboratories, Enjay Research and Engineering Co., Linden, N. J., who spoke on "Compounding Enjay Butyl for Mechanical Applications." The meeting began with a cocktail hour, followed by dinner and the presentation of Dr. Dunkel's paper.

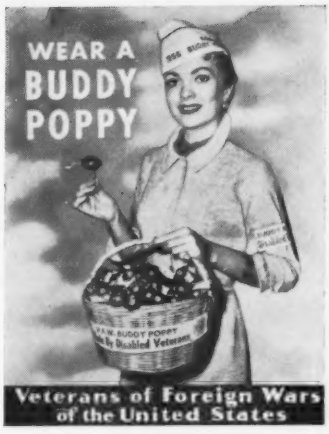
R. A. Garrett (Armstrong Cork), secretary-treasurer of the Philadelphia Group, reported at the meeting that 40 members have joined the organization since the first of the year. Total membership now stands at a new high of 545. Dr. B. S. Garvey, Jr. (Sharples Chemicals), vice-chairman of the Division of Rubber Chemistry, American Chemical Society, gave a report on the November, 1955, meeting of the Rubber Division. He thanked the members of the Philadelphia Rubber Group for their cooperation and participation as hosts for this record-breaking meeting of the Rubber Division.

In his address, Dr. Dunkel observed that for a number of years the use of Butyl rubber in mechanical goods was limited. This was due mainly to the fact that the greater percentage of the polymer was on allocation to inner tube manufacturers. Now, however, more Butyl is becoming available for other applications where its inherent properties dictate its use. Dr. Dunkel stated that the high tear strength of Butyl, both hot and cold, makes it an excellent choice for molded and inflated articles. Not to be overlooked are the excellent electrical properties which have made Butyl a leader in high voltage insulation.

Discusses Butyl Compounding

Like other polymers, specific applications dictate the manner in which Butyl should be compounded. For example, when compounding for the maximum in ozone resistance, the factors which play a most important role are as follows: (a) cure state —this should be as high as possible, (b) polymer type—the lowest unsaturated grades (Enjay Butyl 035 or 150) should be utilized, (c) filler and plasticizer levels when kept at a minimum consistent with other properties are desirable, (d) contamination with elastomers of higher unsaturation must be diligently avoided, and (e) higher sulfur levels favor improved ozone resistance.

When compounding for maximum heat resistance, a different and almost directly opposite approach should be taken, Dr. Dunkel said. Whereas in ozone resistance Butyl having the lowest unsaturation is preferred, the reverse holds true when considering heat resistance. A Butyl compound prepared with the highest unsaturation grade of Butyl—Enjay Butyl 325—exhibits the best retention of physical properties after many heat aging cycles. Besides polymer a relatively high black loading is beneficial. Since the loading is high, it is important to choose the proper black. The MAF blacks are best in sulfur cured systems while the MT and FT blacks are best in the quinoid cured compounds. Higher loadings of zinc oxide are almost mandatory. Quinoid cured vulcanizates offer a more stable linkage which is more resistant to heat reversion than sulfur cured stocks.



Factors affecting the chemical resistance or acid resistance of Butyl vulcanizates are similar to those regarding ozone resistance, he said. These factors include: (a) the use of a low unsaturation polymer (Enjay Butyl 035), (b) low filler loadings—fine particle size fillers (mineral fillers should be avoided), (c) cure systems—contact with strong oxidizing agents almost necessitates the use of sulfur cures. Heat treated or thermally interacted Butyl-carbon black systems exhibit a higher acid resistance than do conventionally mixed compounds.

The abrasion resistance of Butyl can be made as good, if not better, than other general purpose polymers by compounding a dynamically soft vulcanizate. Methods for attaining this are as follows: (a) Butyl polymer—the highest molecular weight available is desirable along with a low unsaturation, (b) carbon black—SAF blacks in conjunction with an oil plasticizer or MPC black by itself appear to be best, and (c) cure system should be composed of low sulfur content, 1 phr is usually employed to obtain a low state of cure.

Cites Gas Permeability

The use of Butyl where gas permeability is a predominant feature cannot be overlooked. Compounding Butyl for gas impermeability is mainly dependent upon filler loading. Mica fillers and high loading of furnace blacks offer the best in this respect. Since all grades of Butyl are comparable for this application, the one employed is left to the discretion of the compounder. Low plasticizer content is advisable, however, in many instances as much as 20 phr of plasticizer have been used with no ill effects, Dr. Dunkel concluded.

Becco Chemical Division of Food Machinery & Chemical Corp., Buffalo, N.Y., has announced the development of three novel epoxy compounds: octylene oxide; dodecene oxide, and C_{16}-C_{18} olefin oxides. All are long-chain epoxidized olefins.

RHODE ISLAND HEARS DUKE ON OIL RESISTANCE OF NITRILE

N. G. Duke of the B. F. Goodrich Chemical Co., Avon Lake, Ohio, delivered the principal address at the April 5th meeting of the Rhode Island Rubber Club which was held at the Pawtucket Golf Club, Pawtucket, R. I. Mr. Duke spoke on "Factors Influencing the Oil Resistance of Nitrile Rubbers." The meeting was also addressed by Dr. Norris D. Hoyt of St. George's School, Newport, R. I., who spoke on "Racing the Kormaron Across the Atlantic." Dr. Hoyt illustrated his talk with colored slides.

In his address, Mr. Duke first explained that nitrile rubbers are prepared from butadiene and acrylonitrile. Oil resistance is the most important property of a nitrile rubber and is the reason for its extensive use even when they cost substantially more than natural rubber or general purpose synthetic rubbers. Oil resistance is the ability of the vulcanizate to retain its original physical properties such as modulus, tensile strength, abrasion resistance, and dimensions, while in contact with oils or fuels. The oil resistance of nitrile rubbers is determined by two primary factors. First, the proportion of acrylonitrile in the polymer and second, the chemical nature of the oil or fuel in question determine the oil resistance of the rubbers.

Grades of Oil Resistance

Nitrile rubbers are available in several grades of oil resistance based on the acrylonitrile content of the polymer. Acrylonitrile content may vary slightly among different suppliers but is generally classified as high, medium high, medium low and low, with the high having the best oil resistance. It was further demonstrated that oil resistance is dependent upon acrylonitrile content of the rubber hydrocarbon whether it is arrived at by polymerization or by blending of rubbers of different acrylonitrile contents. This was shown by blends of polybutadiene with high acrylonitrile rubbers as compared to polymers of identical acrylonitrile content prepared by copolymerization. Mr. Duke observed that the effect of the chemical nature of the oil or fuel can be seen by the relationship of the aniline point of the oil on the swelling characteristics of the vulcanizate.

Pigment loading in a nitrile rubber has the effect of diluting the polymer with an inert, non-swelling constituent which causes an over-all effect of slightly reducing the swelling as the pigment load increases. It can be shown that modulus due to loading has no correlation with volume change. However, variation in modulus due to state of cure will bear a relationship to swelling with the low modulus, low state of cure stocks showing the highest degree of swell.

The effect of softeners on volume change can be shown to be related to the extent to which they are extractable in the oil or fuel in question. Where low temperature properties are a factor, it is usually necessary to sacrifice oil resistance to gain low temperature flexibility. Low temperature flexibility improves as the acrylonitrile content decreases, Mr. Duke stated in concluding his address.

NEW APPLICATIONS OF RUBBER IS TOPIC OF WILLIAMS' TALK

An interesting discussion of "New and Unusual Applications of Rubber Products" by George M. Williams featured the meeting of the Washington Rubber Group held on April 18 at the Pepco Auditorium in Washington, D.C. Mr. Williams is the senior development engineer for the Mechanical Goods Division, U. S. Rubber Co., Fort Wayne, Indiana. Approximately 50 members and guests were in attendance. A dinner honoring the speaker was held at the National Press Club preceding the meeting.

Another feature of the meeting was the recommendation of nominees for election to the offices of the group for the 1956-57 period. Presented by Norman Bekkedahl (National Bureau of Standards), acting for H. C. Bugbee (Natural Rubber Bureau), chairman of the Nominating Committee, the slate included the following nominees:

President, Elliott A. Bukzin (Bureau of Ships); *Vice-President*, Douglas K. Bonn (U. S. Rubber), W. B. Dunkle (Goodyear) and George W. Flanagan (Goodrich Chemical); *Secretary*, Daniel Pratt (Bureau of Ships), Robert D. Stiehler (National Bureau of Standards), and Ralph C. Taylor (Naval Research Laboratory); *Treasurer*, J. R. Moore (Firestone), A. W. Sloan (Atlantic Research), and Carroll E. Stewart (Latex & Rubber). Elections will be held shortly.

Since the meetings of the group are held regularly in the Pepco Auditorium without any charges from the Potomac Electric Power Co., owners of the building, a motion was made and approved that a committee be appointed to investigate the advisability of presenting a plaque or certificate to the company expressing the appreciation of the group for the cooperation received. If everything is in proper order, such presentation may be made at the annual banquet of the group. It was also announced that the 1956 summer outing will be held on Friday, June 22, at the Bethesda Country Club, Bethesda, Maryland.

Cites Rubbers and Plastics

In his talk, Mr. Williams first outlined the numerous steps and the varied personnel involved in the adoption of a new rubber project. He used as an example a new molding of chemically blown sponge shaped to fit the oil reservoir of a journal box on a railroad car. This unit acts as a spring to hold an oil distributing pad of felt against the turning journal. Although still in the test stage, this new rubber application bids fair to create a new market.

Turning to foam, the speaker mentioned the rapid progress being recorded in the latex foam field as well as by urethane and vinyl foams. He stated that the concept of a one-piece molded chair cushion, cover, padding and springs in one press shot may soon be a commercial reality. With regard to non-stretchable rubber sheet he referred to the all-rubber returnable shipping container as an example of what can be done in this field.

Coming back to his own specialty—the railroad field—Mr. Williams emphasized the point that the builders of the light weight trains are depending on rubber for springs and vibration absorbers to sell their products to the consumer in the form of an improved ride. He predicted that within the near future the manufacturers of steel springs for automotive vehicles will feel the challenge of rubber springs.

In concluding his talk, Mr. Williams reviewed some of the growing applications of plastics and rubberlike plastics, particularly in the field of chemically-resistant pipes and fittings. He indicated that fluoridation processes would not have made such substantial progress to date without the availability of plastic tubes. On most of these developments, he stated, there are no quick short-cuts which may be viewed as spectacular, but rather slow, sure improvements eventually resulting in better products for industry and the consumer.

At the end of the talk a new sound movie on new applications of vinyl materials and various foams in the automotive industry was shown by courtesy of the U. S. Rubber Co.

A 24-page idea application booklet describing the uses to which vinyl foam can be put has been made available by the Rubatex Division of Great American Industries, Inc., New Bedford, Va.

Coming Events in the Rubber Industry

May 16-18. Division of Rubber Chemistry, A.C.S., Hotel Cleveland, Cleveland, Ohio.

May 16. Washington Rubber Group, PEPCO Auditorium, Washington, D. C.

May 25. Connecticut Rubber Group, Symposium on Reclaimed Rubber.

June 7. New York Rubber Group, Summer Outing, Doerr's Grove, Millburn, N. J.

June 8. Fort Wayne Rubber & Plastics Group, Summer Outing.

June 11-15. Society of the Plastics Industry, Annual Meeting, Commodore Hotel, New York, N. Y.

June 13. Buffalo Rubber Group, Summer Outing, Lancaster Country Club, Buffalo, N. Y.

June 15. Boston Rubber Group, Annual Summer Outing, Andover Country Club, Andover, Mass.

June 17-22. American Society for Testing Materials, 59th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 21. Akron Rubber Group, Outing, Firestone Country Club, Akron, Ohio.

June 22. Detroit Rubber & Plastics Group, Summer Outing, Western Country Club, Detroit, Mich.

June 22. Washington Rubber Group, Summer Outing, Bethesda Country Club, Bethesda, Md.

June 26. Society of the Plastics Industry, Plastic Structures Division Conference, Hotel Roosevelt, New York, N. Y.

Aug. 2. New York Rubber Group, Golf Tournament, Innis Arden Golf Club, Old Greenwich, Conn.

Aug. 17. Philadelphia Rubber Group, Manufacturers' Golf & Country Club, Oreland, Penna.

Sept. 8. Connecticut Rubber Group, Summer Outing.

Sept. 19-21. Division of Rubber Chemistry, A.C.S., Chalfonte-Haddon Hall, Atlantic City, N. J.

Sept. 27. Fort Wayne Rubber & Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Oct. 2. Buffalo Rubber Group, Fall Meeting.

Oct. 5. Boston Rubber Group, Fall Meeting, Hotel Somerset, Boston, Mass.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 5. New York Rubber Group, Henry Hudson Hotel, New York.

Oct. 11-12. Society of the Plastics Industry, New England Section Conference, Wentworth Hotel, Portsmouth, N. H.

Oct. 26. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Oct. 26. Philadelphia Rubber Group, Poor Richard Club, Phila., Penna.

Nov. 16. Connecticut Rubber Group.

Dec. 4-5. Society of the Plastics Industry, Seventh Film, Sheeting and Coated Fabrics Division Conference, Commodore Hotel, New York City.

Dec. 5. Buffalo Rubber Group, Xmas Party.

Dec. 6. Fort Wayne Rubber & Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

Dec. 7. Detroit Rubber & Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 14. Boston Rubber Group, Xmas Party, Hotel Somerset, Boston, Mass.

Dec. 14. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

WASHINGTON HEARS PAPER ON NEW TIRE CORD DEVELOPMENTS

The March 21st meeting of the Washington Rubber Group held at the Pepco Auditorium in Washington, D. C., featured a paper by P. W. Drew, manager of fabric development for the Goodyear Tire & Rubber Co. Mr. Drew spoke on "New Developments in Tire Cords." Mr. Drew limited his discussion only to high strength fibers and discussed tire cord function and construction.

The speaker observed that tire cords are the strength bearing members in a tire (or belt) construction. Strength and shape of a tire will vary with the angle of the cord. Tires with different cord angles will have a different shape even from the same mold. Cord length or span also has a great influence on strength and bruise resistance. The twist of the cord itself is also an important and controllable factor. Twist confers flex resistance, but degree of twist must be balanced at an optimum between strength and fatigue resistance.

Mr. Drew pointed out that all tire manufacturers have the same types of textile fibers available to them. The differences in cord behavior in tires of different origin are, therefore, due to variations in processing by the individual manufacturer. These processing variants may be in adhesive treatment, drying or stretching of the cord. A comparison of cord behavior then followed.

Discusses Cotton and Rayon

Cotton, the first of the tire cords, has two excellent properties. It adheres readily to rubber and it increases in strength when wet. For the latter reason, it is still much used in tractor tires which are often water filled. From the standpoint of strength, fatigue resistance and performance at high temperatures, cotton is quite poor and has given way to its successors. The first of these was rayon. This fiber developed through three major stages—"regular" to "improved" to "super". All were increasingly better than cotton and fortunately were ready and available to take the nation through World War II.

Nylon is today's outstanding tire cord material, Mr. Drew stated. It has performed even better than the laboratories had predicted. Advantages are light weight and better resilience, which means less heat under heavy loads at high speeds. Nylon is twice as good as rayon on a strength-weight basis. Also because of good resilience, it has improved bruise and fatigue resistance. Nylon brings some headaches too, however. It is more expensive to process. Being a thermoplastic, it has "memory" and therefore has to be processed at very high temperatures. The trend toward lower prices for nylon, recently aided by a substantial reduction, tends to minimize these problems.

Mr. Drew concluded his presentation with some remarks on the newer steel wire and Dacron types of tire cords. Wire is extremely strong, but is not too satisfactory on flex. It also requires considerable research on design to overcome requirements for high and full inflation and to reduce the hard riding qualities. These comments pertain to tire cords of wire as used in the usual application and do not necessarily pertain to the co-called "breaker" now used in some tires. Dacron looks very interesting because of its very high strength and toughness, but is still very expensive, he noted.

President's Rubber Report

In accordance with the 1953 law requiring a report by the President on the disposal of the government-owned synthetic rubber facilities, President Eisenhower, on April 30, told Congress that this nation would have more than 1,700,000 tons of synthetic rubber producing capacity by the end of 1956. He estimated that total new rubber requirements would not reach that figure before 1960. In other features of the report, the President:

(1) Recommended that the government's last synthetic rubber facility, the research laboratory operated by the University of Akron, be disposed of.

(2) Urged that research grants to universities and private organizations not be pegged in the future specifically to rubber research, but incorporated in the general program of fundamental research.

(3) Rejected a recommendation from the National Science Foundation that the government consider taking special measures to spur industrial development of "synthetic-natural" rubber (*cis*-polyisoprene rubber). He said it appeared that private industry could be relied upon to do the job unaided.

(4) Stated that stockpiled natural rubber, plus the potential output of synthetic, will be ample for rubber mobilization needs as outlined by the Office of Defense Mobilization.

(5) Estimated that foreign consumers would constitute a rapidly expanding market for synthetic rubber produced in excess of U. S. requirements.

(6) Examined the butadiene situation and estimated that production facilities would be expanded sufficiently to meet planned expansions of copolymer plant capacity.

(7) Hailed the disposal program as a success in that it recovered the government's investment in the plants, had not impaired security, had not harmed competition, and had yielded a return to the government of $22,500,000.

(EDITOR'S NOTE: See pages 295 and 350 of this issue for other news of the President's report.)

Summit Chemical Moves Offices

Summit Chemical Co. has moved its offices from 10½ South High St., Akron 8, Ohio, to 3 Overwood Road, Akron 13, Ohio. The new telephone number is UNiversity 4-2153-4.

AKRON GROUP HOLDS SYMPOSIUM AND ELECTS 1956-57 OFFICERS

The highlite of the meeting of the Akron Rubber Group held at the Sheraton-Mayflower Hotel in Akron, Ohio, on April 6th was a Symposium on Accelerators—Curing Systems. Other features of the meeting included a talk by Frederick H. Mueller, Assistant Secretary of Commerce for Domestic Affairs, and the announcement of new officers selected by letter ballot for the 1956-57 season. Approximately 700 members and guests were in attendance.

The newly-elected officers are: *Chairman,* Harry M. Brubaker (Witco Chemical); *Vice-Chairman,* Harold W. Catt (Goodrich); *Secretary,* Sheldon Nicol (Goodyear); *Treasurer,* Milton Leonard (Columbian Carbon). Announcement of committee chairmen and members will be made shortly.

The symposium, with Dr. Maurice Morton, director of rubber research for the University of Akron, as moderator, was held during the afternoon with five panelists. The subjects covered included the history, theory and manufacturing of accelerators and applications in tires, tubes, mechanicals, foams, wire and cable, and footwear. The panelists were: B. S. Garvey, Jr. (Sharples Chemicals), A. R. Davis (American Cyanamid), R. R. Waterman (Vanderbilt), A. M. Neal (DuPont), and D. E. Baker (Monsanto Chemical). The talks given by each panelist and the questions and answers will be reproduced in full in an early issue of RUBBER AGE.

Discusses U. S. Economy

The theme of Mr. Mueller's talk, given at the evening session following dinner, was the country's economy. According to the speaker, a continuation of good times is assured as long as the government maintains a healthy climate for business expansion. He stated that capital expenditures in 1955 amounted to $28,700,000,000 while the latest survey indicates an expenditure of approximately $35,000,000,000. Such expansion, he said, will create hundreds of thousands of new jobs and billions of dollars of new purchasing power.

Goodrich Chemical Expanding

B. F. Goodrich Chemical Co., Cleveland, Ohio, has announced plans for an $8,000,000 expansion at the company's Avon Lake, Ohio, plant. A major portion of the new expansion will be devoted to expanding manufacturing facilities for various types of Geon polyvinyl resins and plastic compounds, John R. Hoover, president, announced. Work on the new facilities will start early in June with completion set for March, 1957. Mr. Hoover said the new units, when completed, will almost double Avon Lake's present vinyl resin production. It also will mean increased employment but no estimate was given regarding the number of additional people to be employed.

Like to make a suggestion to the industry? Write a letter to the editor! (See page 206).

AMERICAN CHEMICAL SOCIETY HOLDS 129TH NATIONAL MEETING IN DALLAS

Approximately 5,000 chemists and chemical engineers participated in the technical program at the 129th National Meeting of the American Chemical Society held on April 8 to 13 at Dallas, Texas. Nineteen scientific and technical divisions of the society took part in the Spring meeting. A number of papers pertinent to the rubber and rubberlike plastics industry were presented during the six-day meeting. One of these, by John L. Binder and H. C. Ranshaw (Firestone) was on the subject of "Analysis of Polyisoprenes by Infrared Spectroscopy".

In their paper, an infrared spectroscopic method was described for determining the amounts of cis-1,4, trans-1,4, 1,2-, and 3,4 additions in synthetic polyisoprenes. It is based upon measurements of the absorbances of bands at 8.84, 8.68, 10.98 and 11.25 microns, respectively. Examples of analyses of several types of polyisoprenes were given and it was shown that the total found values of the analyses agree well with the chemical unsaturation of the polymers.

The cis-1,4 and trans-1,4 concentrations may be confirmed by measurements and calculations of the 1,4-band at 11.9 microns, the authors said. Emulsion and most alkali metal polyisoprenes contain other structures than those arising from 1,4, 1,2 and 3,4 additions. Hevea and balata are not completely cis- and trans-polyisoprenes, respectively, but contain small amounts of isopropenyl structure, they concluded.

Polymerization Catalysts

"Lithium and Other Alkali Metal Polymerization Catalysts" by Frederick C. Foster and John L. Binder (Firestone) was the title of another paper presented at the meeting. It was stated that lithium differs from the other alkali metals in that it directs the polymerization of butadiene or isoprene predominantly to 1,4 addition structures. In the case of lithium-catalyzed polyisoprene, the 1,4 addition structures are all cis. The other alkali metals direct the polymerization of butadiene largely to the 1,2 addition structure and isoprene largely to the 3,4 addition structure. The differences in physical properties, accompanying the structural variations mentioned above, were illustrated by the example of lithium-catalyzed polybutadiene.

Lithium, sodium, and potassium are used most conveniently as polymerization catalysts by converting them to metal dispersions in petroleum jelly or other inert hydrocarbons. Special care must be used in handling rubidium or cesium metal, the authors stated.

Herbert Leaderman and Richard J. Overberg (National Bureau of Standards) in their paper on "Viscoelastometer for Measurement of Flow and Elastic Recovery", stated that a viscoelastometer of Couette type with stationary outer cylinder has been constructed for the measurement of flow and elastic recovery of highly viscous liquids. It is designed for measurement of recovery if the viscosity is 10^6 to 10^{20} poises when the average retardation time is in the range of minutes to hours and the steady-state compliance is 10^{-4} to 10^{-6} cm. ^{2}dyne^{-1}. It is also suitable for measurement of non-Newtonian flow when the apparent viscosity is not much less than the (Newtonian) viscosity.

Describes Stator Construction

The stator is a precision-bore glass tube (1.5 inches in diameter) which permits visual observation of the sample. Interchangeable rotors (radius ratios 0.21, 0.58, 0.92) are provided, the smallest for materials which are only slightly non-Newtonian and have a small compliance. Torque is applied by weights through a torsion drum; an auxiliary drum counterbalances static friction during recovery. Mirrors on the rotor shaft and a Photopen recorder permit continuous recording of the rotor position. Mercury slip rings permit monitoring of rotor temperature; a mercury seal isolates the sample. The maximum and static friction torques are 5×10^7 and 2.5×10^6 dyne-cm., respectively. The maximum surface shear stress (smallest rotor, 3 inch immersion) is 6.5×10^6 dyne cm^{-2}. Temperatures from —70° to 135°C. have been realized. "End-effect" studies have been made for a range of end clearances with the two larger rotors; with the largest an unusual behavior was observed, it was said.

In their paper on "Investigation of the Mechanism of Cross Linking of Polymers by High Energy Radiation", Leo A. Wall and Daniel W. Brown (National Bureau of Standards) observed that it is generally visualized that in the passage of high energy radiation through polymeric materials, areas of interaction are formed, called spurs, where there is a high concentration of ionized fragments and free radicals. Most of the ions of unlike charge presumably recombine relatively fast but probably in the process produce other free radicals. These radicals through various secondary processes are very likely the means by which most of the chemical changes observed occur. For an understanding of the mechanisms of cross linking, for instance, it is of considerable importance to have some information concerning the energy of the radicals or other species involved in the process, and the site of reaction or origin of the species produced.

Deuterated Styrenes Studied

In this work various deuterated styrenes and deuteroethylene were studied for the purpose of obtaining some information along these lines. Although there were significant small differences produced by deuteration, no large isotope effects were observed, indicating that the processes occurred as might be expected at apparently very high temperature. The effect of oxygen, benzene, and temperature was also studied and was discussed by the authors.

Ronald M. Pike and Donald L. Bailey (Linde Air Products) also presented a paper at the conference, this one entitled "Copolymerization of Vinyl Siloxanes with Organic Vinyl Monomers". The copolymerization of a series of simple vinyl siloxanes containing monofunctional, difunctional, and trifunctional silicon atoms with various organic vinyl monomers was reported. The organic-silicone copolymer systems which were investigated are:

Organic-Silicone Copolymer Systems	
Vinyl Siloxane*	Organic Vinyl Monomer
Tris, bis, mono	Acrylonitrile
Tris, bis, mono	Styrene
Tris, bis, mono	Vinyl acetate
Tris, bis	Vinyl chloride
Tris, bis	Perfluorovinyl chloride
Tris	*N*-Vinylpyrrolidone

*Tris = tris (trimethylsiloxy) vinylsilane, $[(CH_3)_3SiO]_3Si—CH=CH_2$
Bis = bis (trimethylsiloxy)vinylmethylsilane, $[(CH_3)_3SiO]_2Si(CH_3)—CH=CH_2$
Mono = trimethylsiloxyvinyldimethylsilane, $(CH_3)_3SiO—Si(CH_3)_2—CH=CH_2$

The structure of the vinyl siloxane does not appreciably affect the total rate of copolymerization or its reactivity toward a given organic vinyl monomer. Vinyl siloxane monomers were less reactive toward growing polymer radicals than acrylonitrile, styrene, and *N*-vinylpyrrolidone. With monomers such as vinyl acetate, vinyl chloride, and perfluorovinyl chloride, the vinyl siloxanes were more reactive toward polymer radicals terminated with the organic monomer, but less reactive toward polymer radicals terminated with the vinyl siloxane. The total polymerization rate and the molecular weights of the copolymers were markedly affected by the amount of vinyl siloxane in the monomer mixture.

Decreased Polymerization Rate

An increase in the percentage of vinyl siloxane in the monomer mixture results in a decreased polymerization rate and copolymers having lower molecular weights. From the accumulated data obtained in this work, the authors believe that it is now possible to predict the behavior of vinyl siloxanes of complex structure in copolymerization reactions with the above organic vinyl monomers.

To Produce Polystyrene Foam

United Cork Companies, Kearny, N. J., have obtained a license from Badische Anilin & Soda-Fabrik, A.G. of Ludwigshafen, Rhine, West Germany, covering the manufacture of an expandable polystyrene and the production of finished molded articles. The license permits United Cork to utilize the processes and techniques developed by the German firm during the post war years. United Cork officials state that expanded polystyrene products manufactured by the company will be sold under the name "Uni-Crest". Marketing will be handled by a new division, the Uni-Crest Division, with Hugo Stowasser as midwestern sales manager and William E. Stewart as eastern sales manager. In addition, United Cork is establishing specialists in each of their branch offices to handle sales and engineering problems.

Blanchard Named to New Post

Frank W. Blanchard has been appointed to the newly-created position of assistant to Austin Goodyear, executive vice-president of Hewitt-Robins, Inc., Stamford, Conn. Mr. Blanchard will work closely with Mr. Goodyear in the administration and coordination of the company's industrial products divisions, with plants in Buffalo, N. Y., Passaic, N. J., Chicago, Ill., and Philadelphia, Penna., and an engineering organization in New York City. Mr. Blanchard was formerly manager of operations of the Industrial Rubber Division plant in Buffalo. He received his B.S. degree in engineering from Lehigh University and joined Hewitt-Robins in 1936 as an engineer and draftsman. During World War II he gained recognition as the inventor of an improved process for the mass production of "bullet-proof" gasoline tanks for aircraft.

A. F. Dantino, formerly production manager, succeeds Mr. Blanchard as manager of operations of the Industrial Rubber Division. Robert C. Estes, former purchasing agent for the division, is the new production manager. Mr. Dantino is a graduate of Syracuse University. He joined Hewitt-Robins in 1939 as a belt maker in the factory and has held many production and engineering positions. Mr. Estes attended Syracuse University and is a graduate of the University of Buffalo. He joined Hewitt-Robins in 1937 as a general laborer in the factory. He has had experience in production control, time study, inspection and the technical and cost departments. He has been chief purchasing agent at the plant since 1954.

National Aniline Promotes Two

John J. Reed has been named product manager of isocyanates and M. S. Rhodes named product manager of resin chemicals by the National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y. Mr. Rhodes, after an extended period of service with the Falk Division of the Cargill Corp., joined National Aniline as a chemical intermediates salesman in 1953. He is a graduate of City College of New York and received his Master's degree from Brooklyn Polytechnic Institute. Mr. Reed, previously connected with St. Regis Paper Co. and Taylor Wharton Steel Co., has been associated with National Aniline Division as nylon plastics coordinator since 1954. He received his B.S. in chemical engineering from the University of Villanova.

Pine Chemicals Organized

Pine Chemicals, Inc., has been formed at Fieldsboro, N. J. where the company has constructed and placed on stream what is said to be the first commercial processing plant for the continuous distillation and refining of pine oleoresin in this country. An affiliate of Filtered Rosin Products, Inc., Baxley, Ga., Pine Chemicals was formed to bring to New England and the Middle Atlantic States a more readily available supply of high grade rosins and resins.

Goodyear Promotes Holt

Victor Holt, Jr.

Victor Holt, Jr., who has been vice-president of the subsidiary sales company in charge of tire renewal sales, has been named a vice-president of the Goodyear Tire & Rubber Co., Akron, Ohio. The move is part of sweeping changes in top level management of the parent company. Mr. Holt also was appointed to the executive operating committee. A graduate of the University of Oklahoma with a B.S. degree in business administration, he also earned honors as an All-American basketball player. Mr. Holt joined Goodyear in 1929, in a sales training group. Two years later he was transferred to Oklahoma City as service representative, and in 1933 was appointed truck tire salesman in that district. A year later he returned to Akron, being assigned to the retail stores department.

Mr. Holt managed a Goodyear Service Store in Miami, Fla., in 1936, and in 1937 became manager of the company's sales promotion department in Akron. In 1939 he was promoted to district manager at Harrisburg, Penna., and held a similar position in Philadelphia in 1941. Mr. Holt was appointed North Central assistant division manager in 1942. In 1943, he was appointed assistant manager of tire sales at Akron and, in 1944, was made manager of the tire sales departments for the company. He was advanced to vice-president in charge of the replacement tire division in 1949.

Reichhold and Catalin To Merge

Plans for the merger of Reichhold Chemicals, Inc. into the Catalin Corp. of America have been announced by Henry H. Reichhold, chairman of the executive committee of Reichhold, and Harry Krehbiel, president of Catalin. The merger agreement has been executed by the board of directors of both corporations, subject to approval of their stockholders. Upon merger, stockholders of Reichhold will receive 2.8 shares of common stock of the merged company for each Reichhold share. Catalin stockholders will retain their holdings. A substantial amount of stock to be received by Reichhold stockholders in the exchange will be placed in a voting trust.

Brazier Retires From Dunlop

S. A. Brazier, technical manager of the General Rubber Goods Division of the Dunlop Rubber Co., Ltd., London, England, retired on March 31 after 37 years in the rubber industry. Mr. Brazier is chairman of the Council of the Institution of the Rubber Industry and a Colwyn medalist. Born in Birmingham, England, Mr. Brazier became a lecturer in the Chemistry Department at the Municipal College of Technology there after graduating with a B.Sc. and M.Sc. from Birmingham University. On demobilization from service after World War I, Mr. Brazier joined Dunlop's technical staff as deputy to the chief chemist.

When the Macintosh group of companies were merged with Dunlop in 1926, Mr. Brazier was appointed chief chemist to Charles Macintosh and Co. to organize the chemical side of their activities. This section became the Industrial Goods Division of Dunlop with Mr. Brazier as its technical manager, and he was then made a director of Dunlop in Manchester. He has played a prominent part in the work of the British Standards Institution and is at present chairman of the Rubber Industry Standards Committee. After World War II, at the request of Rubber Control, he organized and led a number of teams to Germany to investigate rubber manufacture. For his war services to Rubber Control he received the O.B.E. in 1948. He was elected a Fellow of the Institution of the Rubber Industry in 1926.

Two Join Borden Chemical

Donald A. Regnier and Errol M. Thompson have joined the technical staff of the Resinous-Reslac Department of the Chemical Division, Borden Co. Engaged in industrial engineering and sales management with the Plymouth Rubber Co. of Canton, Mass., for the past ten years, Mr. Regnier will serve industrial customers of Borden's Chemical Division in the state of Ohio. He will operate from the Resinous-Reslac Department's plant at 3634 West 38th Street, Chicago, Ill. Mr. Thompson for the past nine years has been in the welt shoe industry as salesman and sales manager for Thompson Shoe Products, Inc., of Brockton, Mass. He developed and sold thermoplastic shoe bottom filler and thermoplastic adhesives, together with novel application equipment. He will work in the New England area from Resinous-Reslac's Peabody, Mass. plant.

Contemplates New Plant

M. W. Kellogg Co., New York, N. Y., has announced the purchase of a large piece of property in the Houston (Texas) Ship Channel area as site for a contemplated plant for the production of new types of polyolefin plastics. Exact location of the land was not revealed. Kellogg's parent company, Pullman, Inc., recently announced that it had signed a license agreement with the Phillips Petroleum Co. looking toward production of these plastic materials by a special process owned by Phillips.

C.I.C. RUBBER DIVISION SETS PROGRAM FOR MONTREAL CONFERENCE

The Rubber Division of the Chemical Institute of Canada has announced its program for the Annual Conference to be held at the Mount Royal Hotel in Montreal, Que., Canada, on May 30, 1956. The meeting will be held in conjunction with the meeting of the parent society which is being held on May 28, 29 and 30. Rubber Division members are urged to attend the C.I.C. reception and banquet on the evening of May 30. The Rubber Division business meeting will be held at 11:30 A.M. on May 30. Abstracts of the eight papers to be presented at the Rubber Division Conference follow:

Behavior of Rubber Vulcanizates Containing a Variety of Fillers. ***B. B. Boonstra and E. M. Dannenberg (Godfrey L. Cabot, Cambridge, Mass.).*** Physical properties of vulcanizates made from GR-S, natural rubber, neoprene, and acrylonitrile-butadiene copolymer rubber with various fillers are described. The fillers studied include representative groups of carbon and non-carbon pigments in formulations adjusted for maximum tensile properties. The reinforcement characteristics of these fillers as measured by effect on modulus, tear resistance, abrasion, etc., run parallel in the different elastomers. Though this study gives a broad picture of the reinforcing properties of the pigments, the ultimate choice of the type and amount of filler depends on the particular application.

The degree of interaction of the various fillers and polymers was determined by swelling and modulus measurements. With carbon blacks the unvulcanized and vulcanized matrix is significantly changed in its behavior towards liquids. This is evident from the observation of bound rubber phenomenon and the reduced swelling of the rubber portion of a loaded compound as compared with the pure gum vulcanizate. This reduction in swelling increases with the loading of black and is particularly pronounced with the more reinforcing blacks.

White pigments do not show such regular behavior and, in some instances, the swelling of the matrix is completely unaffected by the presence of pigment. This is observed with some of the most reinforcing white fillers. Bound rubber phenomena are observed with both white and black fillers.

The Properties and Applications of Coral Rubber — A Cis-Polyisoprene. ***Glen Alliger, J. M. Willis, and W. A. Smith (Firestone Tire & Rubber Co., Akron, Ohio).*** Coral rubber is a high molecular weight polyisoprene having the essential molecular structure of natural rubber and prepared by lithium catalysis. As a result of this structural similarity, Coral rubber is like natural rubber in its properties. In particular, Coral rubber has the low heat build up (i.e., low hysteretic loss), the good retention of strength at elevated temperatures and the good resistance to tear and cut growth which are characteristic of natural rubber. Coral and natural rubber are similar in their reactivity to sulfur and oxygen. This similarity manifests itself in similar vulcanization and aging characteristics.

These properties of Coral rubber suggest that it should be suitable for certain tire and non-tire products for which, heretofore, natural rubber has been the only satisfactory elastomer available. On the other hand, the butadiene-styrene copolymer made at 41°F. (cold rubber or LTP) is deficient with respect to some of the above critical properties. These deficiencies make LTP unsatisfactory for certain applications. Although Coral and natural rubber are, in general, alike in properties, they are different in certain important respects. The possible effect on end product application of these similarities and differences are discussed in some detail.

The Reaction of Molecular Oxygen with Rubber. ***E. M. Bevilacqua (U. S. Rubber Co., Passaic, N. J.).*** Experimental work during the past few years has laid the foundation for an accurate understanding of the interaction of oxygen with raw rubber and of its effect on the aging of vulcanized rubber. This paper will review a portion of the recent work contributing to the replacement of qualitative speculations by quantitative knowledge.

Although direct experimental evidence for the reactions occurring during the oxidation of rubber is meager, the sequence of steps leading to the primary product of the oxidation of low molecular weight hydrocarbons has been worked out in great detail. This, combined with what is known about (natural) rubber enables us to set up a clear picture of the first step in the oxidation of rubber, formation of the hydroperoxide. Current work is concerned with the subsequent steps leading to chain scission and the formation of volatile products.

Detailed discrimination between the reactions occurring when vulcanized rubber is oxidized has become possible through the application of the "stress relaxation" technique introduced by Tobolsky. This work has shown that crosslinks are rapidly attacked by oxygen in a process in which antioxidants for olefin oxidation are relatively ineffective.

Tire Cord—How Tangled Can It Get. ***R. W. Kolb (Dominion Textiles Co. Ltd., Drummondville, Que.).*** The evolution of tire fabrics from the early cotton forms to the present day high tenacity rayon and nylon cords is outlined to show the development of today's technological concepts. Inherent fiber properties, cord size and cord geometry when twisted are related to such performance characteristics as tensile strength, load elongation, fatigue or flex-life, moisture behavior, adhesion to rubber and cord growth or instability in use. Of necessity, these factors can be considered only in the light of the current, imperfect methods of evaluation, which are discussed briefly. Limitations to the attainment of potentials, indicated by research, under production scale manufacturing methods are reviewed and recent improvements are considered, along with certain developments which appear to be on the horizon.

Exposure Cracking of Sidewall Compounds. ***D. C. Edwards and E. B. Storey, (Polymer Corp. Ltd., Sarina, Ontario).*** A study of the ozone cracking behavior of Polysar S sidewall compounds is described, with particular emphasis on the combined action of an antiozidant and a protective wax. Three types of experimental procedure were evolved for this purpose, and the development and application of these techniques are described in detail. The static exposure of spirally-deformed specimens to a controlled ozonized atmosphere showed the effects of strain on the cracking. A microscopic study of strip specimens exposed at 20% strain provided information on the induction period, the number and the growth behaviour of the cracks. The exposure of specimens mounted on the sidewall of a tire proved to be a simple and economical means of testing under conditions nearly identical to those of actual service.

Both the wax and the antiozidant decrease the number of cracks at a given strain. The antiozidant also retards the growth rate of the cracks. The protective action of combination of the wax and antiozidant is greater than would be predicted from the individual performances of the two agents, and the use of such combinations provides the best protection against cracking. Mechanical failure of the surface wax film was not observed in the sidewall test, even with loading of 6 parts of wax.

Useful Aspects of the Application of High Intensity Nuclear Radiation in the Rubber Industry. ***S. D. Gehman (Goodyear Tire & Rubber Co., Akron, Ohio).*** Atomic power generation projected for the next decade will provide radioactivity in unprecedented quantities. Long range estimates of the equilibrium amount of radioactive by-products which may accumulate in fifty years are of the order of 10^{11} curies. Constructive uses for the radiation from spent fuel elements or separated fission products can contribute significantly to the development of economic atomic power and alleviate a serious disposal problem. Research is beginning to show the possibility of applications of intense gamma radiation of interest for the rubber industry. This is basically due to the coincidence of the free radical nature of rubber chemistry and the potency of radiation as a source of free radicals, ions, and excited molecules.

Pile irradiated Co 60 sources have been used in a wide variety of arrangements to explore the effects of intense gamma radiation on materials and chemical reactions. Intense radiation has unique features as an initiator for polymerization reactions and provides opportunities for the development of new types of synthetic rubber, especially graft polymers. As a promoter of crosslinking, irradiation can serve to raise the softening point of some plastics, increase solvent resistance and improve physical properties.

Most types of rubber can be vulcanized by irradiation although a relatively large dose is required. Such vulcanizates are generally distinguished by exceptionally good aging properties. Practical use of radiation for such purposes is contingent

on cheaper sources and extensive developments in the technology of working with large amounts of radioactivity. The rubber industry should have an especial interest in the development of multipurpose nuclear reactors adapted to furnish operating power, process heat, and intense gamma radiation.

The Synthesis and Polymerization of Vinylidene Cyanide-Darlan Fiber Comonomer. ***F. D. Stewart (B. F. Goodrich Co., Brecksville, Ohio).*** Vinylidene cyanide, the precursor to the new man-made fiber "Darlan" may be synthesized by the pyrolysis of 1,1,3,3-tetracyanopropane, 1,1-dicyano-ethyl acetate or 4,4-dicyanocyclohexene. The monomer, which must be stabilized by acidic materials during pyrolysis and storage, homopolymerizes by an anionic process in which water, alcohols, amines and ketones serve as catalysts. Copolymers may be formed with a wide range of common monomers in non-aqueous systems by a free radical initiated reaction. The copolymers in contrast to the homopolymer are stable to moisture, bases and heat. These copolymers may be processed into fibers, films and molded goods.

Vinylidene cyanide reacts, in the presence of anhydrous aluminum chloride, with aromatic hydrocarbons, phenols, phenol ethers and certain aromatic heterocycles to give monosubstituted malononitriles. Diels-Alder adducts are readily formed with vinylidene cyanide and most dienes. "Darlan" fiber, a copolymer of vinylidene cyanide is presently being manufactured on a semi-works scale and is being tested for consumer acceptance in sweaters, pile and suiting fabrics.

Use of Polyethylene in Blends with Cold Rubber. ***Paul Carpenter (Phillips Chemical Co. Bartlesville, Okla.).*** The new low-pressure polyethylene as exemplified by "Marlex 50" polyethylene has been shown to convey interesting properties to vulcanizates comprising this polymer and cold rubber with or without carbon black. Gum stocks are found to be reinforced to a much greater extent than is possible with conventional polyethylene. In shoe sole compounds Marlex 50 polyethylene compares favorably to high styrene resins conveying good tear resistance, stress-strain properties, flex life (De Mattia crack growth test at 210°F.), and excellent resistance to abrasion (NBS abrader).

Combinations of Marlex 50 polyethylene with low levels of HAF carbon black has led to the development of tire tread stocks with excellent road wear characteristics as shown in actual tire tests. These treads operate at lower temperatures (deceased heat build-up) than do normal cold rubber-HAF carbon black compounds and may find useful applications in heavy duty truck tires. It is expected that further developments will be forthcoming based on properties conveyed by Marlex 50 polyethylene to cold rubber compounds.

Fawick Airflex Division of the Fawick Corp., Cleveland, Ohio, has published two new bulletins. The first of these, Bulletin ML-102-A, covers the "Fawick VC Ventorque Clutch", and the second, Bulletin ML-135 is on "Fawick Timing Rotorseal". Both are available from the company.

Bleeck Named Chief Chemist

Emanuel Bleeck

Emanuel Bleeck has been appointed chief chemist of the Western Insulated Wire Co., Los Angeles, Calif. according to an announcement made recently by E. H. Lewis, president. Mr. Bleeck began his career in the wire and cable industry in 1935 at Crescent Insulated Wire and Cable Co., Trenton, N. J. In 1936, he moved to Circle Wire and Cable Corp., Maspeth, N. Y., where he became assistant chief chemist in 1938. He continued this association until his present appointment became effective in March of this year. Mr. Bleeck has been for 19 years a member of the New York Rubber Group and has now transferred to the Los Angeles Rubber Group.

Paisley Pliastic Adhesives

Paisley Products, Inc., 630 W. 51 Street, New York 19, N. Y., has developed a new series of nine "Pliastic" adhesives, based on synthetic resins, latices, lacquers and other organics, which are custom-formulated to provide maximum adherence to the plastic materials that are now most widely used in the packaging industry. Pliastic-241, the most versatile, is built around synthetic latices and is recommended for surface-treated polyethylenes, Mylar and heavily waxed glassines. Pliastic-242 and 243 are of heavier viscosity than 241, for use where such an attribute is necessary in the packaging machinery. Pliastic-7051 is also a latex base, but is said to be particularly suited for work with Pliofilm. Pliastic-1707 is formulated for adhering paper labels to surfaces such as lacquered, varnished, printed or metal containers, plastic bottles or closures, and plated metals. Pliastic-5515 and 8019 are polyvinyl acetate type adhesives. The former is said to be most effective with cellulose acetate, polystyrene, Saran and cellophane packages, the latter for acetate windows to be built into paperboard boxes. Pliastic-7346 is another synthetic resin-latex compound for acetate window work. Pliastic-8423 is the lacquer type member of the family, specifically compounded for the new Mylar, and approved by DuPont for use with that material. Also available are carbohydrate-base adhesives 6718 and 6722 for use with the new silicone-coated bottles.

FORT WAYNE HEARS JONES ON HIGH-SPEED EXTRUSION

The Fort Wayne Rubber and Plastics Group held its fourth meeting of the 1955-56 season on April 12 at the Van Orman Hotel in Fort Wayne, Ind., with approximately 145 members and guests in attendance. Principal speaker of the meeting was J. H. Jones of the Bakelite Co., New York, N. Y. Mr. Jones spoke on "Factors Relating to High-Speed Extrusion" and used slides to illustrate his talk. B. H. Maddock, also of Bakelite, co-author of the paper was present and offered a few brief remarks on the subject.

In his talk, Mr. Jones emphasized that an enormous growth has taken place in the field of plastic extrusion during the past decade. This growth has been evidenced in both the amount and in the types of plastics being extruded and in the number of extruding machines in operation. Difficulties arose when larger equipment had to be designed for new plastics compounds. These units had to be designed on the basis of data available from experience with smaller extruders.

Mr. Jones believes that extruders today are producing at rates far short of their capacity and that higher speed extrusion is feasible. He stated, however, that in any consideration of high-speed extrusion, the variables present in normal extrusion, especially those which directly determine output, are to be reckoned with.

The speaker went on to discuss fundamental mechanisms in the extruder itself and described the operating characteristics of the extruder. The numerous variations in design of extruders makes it impractical to lay down hard and fast rules for high-speed extrusion, he said. However, a knowledge of the principles involved will do much to solve the individual problem.

Bureau of Ships Specifications

The Bureau of Ships of the Department of the Navy, Washington, D. C., has announced the issuance of three new specifications. MIL-G-18586 (SHIPS) covers O-Rings for use aboard naval vessels, serviceable to minus 20°F., and primarily for electrical switch-boxes and other electrical closures. However, these O-Rings should also find use in other general applications for static seals which are not exposed to temperature extremes. Two classes of material are specified in this specification; Class 1 for butadiene-styrene copolymers and Class 2 for butadiene-acrylonitrile copolymers.

MIL-H-19030 (SHIPS) covers wire reinforced rubber hose for steam service up to a maximum working pressure of 100 pounds per square inch gage and a maximum temperature of 338°F. It was issued for temporary steam connections from docks to ships and from ships to ships. However, this hose should also find use in other temporary steam connections where medium steam pressures are involved.

MIL-H-19091 (SHIPS) covers a very light-weight, high strength, discharge hose for transferring diesel and furnace oils and aircraft fuels by the astern method. This is a special purpose naval hose and probably will not find use in other applications.

Thiokol Polyurethane Prepolymer

Thiokol Chemical Corp., Trenton, N. J., has announced the development of a new polyurethane prepolymer for resilient water-absorbent foams. The prepolymer, designated as "Thiokol ZL-239", can be processed into water-absorbent foams with a combination of properties unobtainable through conventional polyurethane or other resins and materials currently available, the company states. Foamed materials made of ZL-239 are of uniform cell size and smooth texture. They combine resilience and strength, both wet and dry, with water absorption properties equivalent to those of cellulosic materials. For example, tests conducted by Thiokol have disclosed that the water pick-up of ZL-239 foams is about ten times that of conventional polyurethane foams. The properties of the new product indicate its suitability for industrial and household sponges, mops, wiping cloths and other products requiring high water pick-up and permanent resilience.

Thiokol ZL-239 is packaged as a three-component mix to assure stability. One component is an emulsifier, a second is the prepolymer, and the third is a catalyst. Storage for three months under ambient conditions has indicated no change in the viscosity of foaming performance of the mix. Processing of the prepolymer into a foam involves simple equipment only, the company states. It can be processed by machine or through a spray gun and can be molded into relatively complex shapes. The density obtained with ZL-239 is 4.5 pounds per cubic foot. However, lower density foams can be made by small variations in the water content of the catalyst component. The foamed resin also has good wipe-up properties, which can be varied to yield different degrees of wiping action. The foamed resin can also be made in a range of colors and it appears to have somewhat better color stability than the conventional polyurethanes, Thiokol declares.

Philip Carey Appointments

Philip Carey Manufacturing Co., Cincinnati, Ohio, has announced a number of management appointments in keeping with the company's over-all expansion plans to increase plant facilities, product lines and markets. H. Ross Barrett has been appointed executive vice-president. He has been with the firm since 1943 as vice-president and controller and vice-president-finance. Earl C. Faulkner has been appointed vice-president in charge of the Western Division. Mr. Faulkner was formerly executive vice-president of the Lehon Co., which company was acquired by Philip Carey in February of 1955. Clarence E. Howard has been named vice-president of the company in charge of the Eastern Division. Mr. Howard has progressed through the Carey organization, starting as a sales representative. Edgar A. Boadway has been appointed vice-president in charge of the company's Canadian Division, and Edwin F. Ziegenhardt has been appointed controller.

Like to make a suggestion to the industry? Write a letter to the editor! (See page 206).

Koppers Promotes Four

John W. Pool, Jr., formerly assistant manager of the Chemical Division Sales Department, Koppers Co., Inc., Pittsburgh, Penna., has been named manager, replacing Carl H. Pottenger who was appointed vice-president and assistant general manager of the Chemical Division. At the same time, B. R. Sarchet, also a former assistant manager of the Sales Department, was promoted to manager of the division's Development Department, replacing Frank B. Varga who was appointed a vice-president of the newly established Koppers International, C. A. H. D. Cooper, manager of the division's Eastern District sales in New York City, was promoted to assistant manager of the division's Sales Department. R. F. Seubert, supervisor of the Chemical Division's Sales Office in Pittsburgh, has been named to succeed Mr. Cooper.

Foam King Enlarges Plant

In the June, 1954, issue of RUBBER AGE there appeared an article which announced the completion of research and development on two distinctly new processes for the formulation of foam plastics by Foam King, Inc., New York, N. Y. One of the processes concerned itself with the production of an open cell foam plastic, while the other had to do with the production of closed cell foam plastic. Foam King now announces the removal and enlargement of its laboratory and plant facilities to a full-grown factory set-up at 1816 Boston Road, New York 60, N. Y. Here, the company will conduct a manufacturing operation of end products principally to keep up with the changes in the art of manufacturing techniques as well as to meet a portion of the demand for its own products. Foam King will also manufacture the basic plastisol for its own needs as well as for the needs of its licensees. With start-up of its own production, Foam King will be in a position to offer its processes to interested firms throughout the world on a license basis.

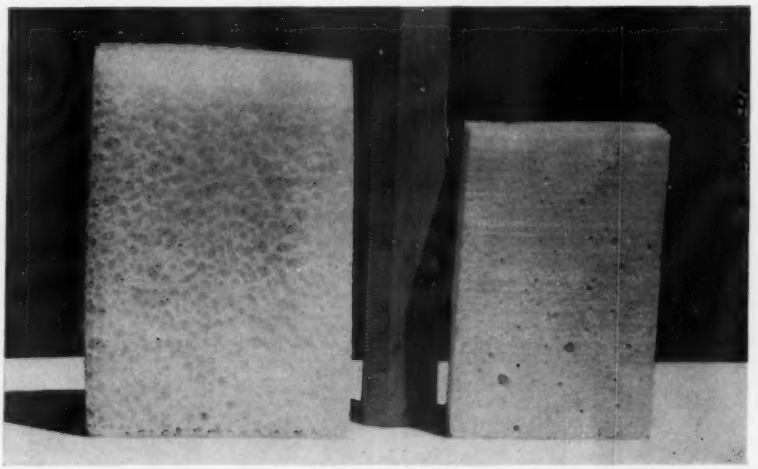
Esso Licenses French Firm

Esso Research and Engineering Co., New York, N.Y. has issued a license to Société du Caoutchouc Butyl (SOCABU) for the first Butyl synthetic rubber plant to be built overseas. The plant is to be built at Port Jerome, in the Le Havre region of France. Engineering work has already been started, and construction is expected to be completed in 1958. The unit will have a capacity of 20,000 tons per year, and will be the fourth Butyl rubber plant in the world. Other Butyl plants are now owned by Polymer Corp., a Canadian government company, at Sarnia, Ont., Esso Standard Oil Co. at Baton Rouge, La., and Humble Oil & Refining Co. at Baytown, Texas. Esso Standard and Humble purchased their plants from the U.S. government last year. Total capacity of the three existing plants is about 115,000 tons annually. Two other companies have been licensed by Esso Research to build Butyl plants in the United States.

The capacity of the French plant will be sufficient to meet projected future French requirements for Butyl rubber. During the first years of operation, there will be some Butyl rubber available for export to other countries. SOCABU has also been licensed by Esso Research to use its technique for recovering isobutylene from refinery gases. This will enable SOCABU to recover isobutylene in its plant from the petroleum gases of nearby refineries at Gonfreville and Port Jerome.

Production Starts at Institute

Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has announced that production of GR-S type rubber was started April 19 in the former government-owned plant at Institute, W. Va. The plant was purchased from the Government for $11,000,000. Taking possession on February 21, Goodrich-Gulf now has one of three production lines in operation. The plant has a capacity of 122,000 long tons of American rubber annually when in full operation.



A comparison of the swell due to water pick-up of "Thiokol" ZL-239 foamed resin compared to a standard polyurethane foam. The ZL-239 foam (on the left) picks up about ten times as much water as the standard polyurethane without mechanical manipulation, and swells about 40% in volume.

SOUTHERN OHIO HEARS HONN ON FLUOROCARBON ELASTOMERS

Approximately 80 members and guests attended the March 8th meeting of the Southern Ohio Rubber Group held at the Engineer's Club in Dayton, Ohio. Principal speaker of the meeting was Dr. Francis J. Honn of the Petroleum and Chemical Research Laboratory, M. W. Kellogg Co., Jersey City, N. J. Dr. Honn spoke on "The Search for a Fluorocarbon Elastomer". Dr. Honn illustrated his talk with slides and had a large display of samples on hand.

In his address, Dr. Honn stated that fluorocarbon elastomers are of interest to the rubber industry not only because they open a whole new field analogous to hydrocarbons but also because they provide the combination of heat and chemical resistance needed for many critical rubber applications today. The synthesis of an elastomer containing a large proportion of fluorine is not easy because fluorine makes polymer chains stiff and plastic rather than elastomeric. However, research during the past several years has uncovered three general methods of synthesizing an elastomer containing a high proportion of fluorine: (1) Copolymerization of butadiene with fluoro-olefins; (2) Polymerization of partially fluorinated dienes; (3) Copolymerization of fluoro-olefins to produce a saturated polymer chain containing enough hydrogen to provide flexibility but not enough to destroy the heat and chemical resistance characteristic of fluorine polymers.

"Kel-F" Elastomers 5500 and 3700, copolymers of chlorotrifluoroethylene and vinylidenefluoride, are examples of the third class. These new rubbers, which can be vulcanized effectively with peroxides and polyamines, are finding application in hose, seals, diaphragms, and other specialized items which must handle strong acids, oxidants, and hot fuels and oils. Properties and applications of these new fluorine polymers were discussed in detail by the speaker.

Copolymer Elects Officers

At the annual meeting of the Copolymer Rubber & Chemical Corp., Baton Rouge, La., held on April 12, A. L. Freedlander, president of Copolymer and president of the Dayton Rubber Co., was elected chairman of the board of Copolymer. A. K. Walton, supervisor of the Tire Division, Sears Roebuck & Co., succeeds Mr. Freedlander who had been president since Copolymer's inception in 1942. John G. Gates, vice-president of the Gates Rubber Co., is secretary and Frederick Machlin, president of Armstrong Rubber Mfg. Co., was reelected treasurer. All the other officers were likewise reelected. Mr. Walton is also chairman of the executive committee, a post formerly held by Mr. Freedlander, but the latter is continuing as a member of the committee. James H. Hoffman, president of Mansfield Tire & Rubber Co., and James A. Walsh, president of Armstrong Rubber Co., are also members of the executive committee. Under private ownership, the volume of work has increased to such an extent that Mr. Freedlander requested he be relieved as president.

Named to New York Office

William T. Smith

William T. Smith, who for the past 14 months has been training in technical sales and performing sales service work in the Coating Department of the Chemical Division, Goodyear Tire & Rubber Co., has been assigned as a sales representative at the New York office of the division. In his new post, Mr. Smith will handle sales to manufacturers in the coatings field and will also be concerned with applications of all solution grade resins and latices produced by the Chemical Division. He will offer direct technical assistance to textile finishers and manufacturers of paper products and will render technical assistance to paint, leather and adhesives manufacturers. Mr. Smith joined Goodyear in June, 1954, following his second tour of duty with the U.S. Marine Corps. He received his B.S. in chemical engineering from the University of Missouri. He is a member of the American Institute of Chemical Engineers.

Appointments at Hercules

The appointment of two additional representatives to the technical sales staff of the Plastics Sales Division of the Hercules Powder Co. has been announced by Werner C. Brown, director of sales for Hercules' Cellulose Products Department. The new plastics technical sales representatives are Joseph J. Coughlan and Benjamin F. Brown. Mr. Coughlan is returning to the Hercules Cellulose Products Department after five years with Standard Insulation Co. as assistant sales manager and then sales manager. He first joined Hercules in 1942. Mr. Coughlan will be stationed, for the next three months, in the Plastics Laboratory of the Parlin, N. J. plant on an orientation program. Mr. Brown joined Hercules in 1950 and was first employed in the Physics Division at the company's Experiment Station. In 1953 he was transferred to the company's Parlin plant, where he worked in the Plastics Laboratory on sales development activities. In 1955 he was made a senior chemist at Parlin. He is a graduate of Eureka College, Eureka, Ill., and also taught there before joining Hercules.

Have some comments to make? Write a letter to the editor! (See page 206.)

ELASTOMER & PLASTICS GROUP HEARS PAPER ON EPOXY RESINS

The April 17th meeting of the Elastomer and Plastics Group, Northeastern Section of the American Chemical Society held at the Hotel Continental in Cambridge, Mass., featured a paper by Farris W. Swackhamer, manager of the Resins and Plastics Department, Shell Chemical Corp., New York, N. Y. Mr. Swackhamer spoke on "Utilization of Epoxy Resins." The talk was preceded by a cocktail hour and followed by a dinner.

In his address, Mr. Swackhamer pointed out that the epoxy resins, based upon epichlorohydrin and bisphenol-A, are a new resin type in the rapidly expanding high polymer field. They are particularly interesting to the industrial chemist because of the novelty of the chemistry involved and because of their many successful applications in structural plastics, protective coatings, and adhesives.

Epoxide chemistry is a field that has attracted little interest in the past, either academically or in industry. With the advent of epichlorohydrin as a commercial chemical in 1946, however, Shell laboratories delved deeply into the chemistry of the epoxide ring. The result is the present, full-blown effort on epoxy resins, he declared.

These materials, varying in molecular weight from 400-8000, still retain epoxy and hydroxy groups capable of further reaction. By themselves, epoxy resins have little utility, even when baked, but reaction with curing agents, such as amines, acids, anhydrides, and phenolic and urea resins, produces crosslinked, thermosetting polymers of outstanding properties. The resins can also be esterified with vegetable fatty acids to produce fast drying paint vehicles useful in floor varnishes, maintenance paints, and porch enamels, the speaker concluded.

Super Mileage Truck Tire

A new truck tire that is built like a heavyweight boxer—rugged, broad-shouldered and able to take the roughest punishment for round after round—has been engineered by the Firestone Tire & Rubber Co., Akron, Ohio. Firestone engineers developed the "Super Mileage Lug Tire" for the toughest types of on and off-the-road service. The tire is especially designed for dump trucks, cement mixers, logging, mining and quarry trucks. Its extra-wide tread combines central rider ribs for smooth highway service, cross grooves and heavy shoulder lugs to increase traction in mud or snow. The rugged, offset shoulder design resists sidewall cuts and snags, Firestone states. The cut-resistant tread has approximately 60% more skid depth than ordinary highway truck tires. This deeper tread provides more traction and longer wear. Ordinary tires designed on the cross-bar principle are susceptible to cross skidding, but in the Super Mileage Lug tire this tendency is eliminated by deep grooves and traction slits. Firestone's first new truck tire of 1956, the Super Mileage Lug is being offered as a tubeless tire or with an inner tube. The tire is available with an all-nylon cord body.

MIT Special Summer Program

"Recent Advances in Catalytic Polymerization" will be the subject of a two-week special summer program to be given at the Massachusetts Institute of Technology from July 17 through July 27 during the 1956 Summer Session. "This program", says Professor Ernest H. Huntress, director of the M.I.T. summer session, "is directed to active and potential research workers in polymerization and allied fields of chemistry. It will present and discuss current knowledge of catalytic polymerization." Dr. Avery A. Morton, professor of organic chemistry at M.I.T., will direct the program. Lecturers will include Dr. Walter H. Stockmayer, professor of physical chemistry, Dr. Edward J. Lanpher of the M.I.T. research staff, and several guest speakers.

The program will consist of lectures, discussions, and demonstrations. First, reactive organo-metallic complex substances will be classified into types, and the existing methods for their preparation and analysis will be described. The general effects of such complexes in organic chemical reactions will be systematically presented. Second, the presently known specific reagents for polymerization will be studied in detail. Consideration will be given to features of the resulting polymer structures, known chemical and physical methods for characterizing polymer structure, possible structural effects of side reactions which may accompany polymerization, and the kinetics of heterogeneous catalytic polymerizations.

The program will conclude with a formulation of general principles concerning the mechanisms of catalytic polymerizations and the nature of the polymers produced, their present place in polymer science, and their potentialities. Although some previous familiarity with polymerizations would be helpful, this is not imperative for participants in this special summer program, points out Professor Huntress.

Registrants for this special summer program may reserve rooms in the Institute's dormitories during the program. All M.I.T. recreational facilities, including the swimming pool and popular sailing pavilion on the Charles River Basin, are available for their use. Full details and application blanks may be obtained from the Summer Session Office, Room 7-103, Massachusetts Institute of Technology, Cambridge 39, Mass.

New Brilliant Toning Red

The Sherwin-Williams Co., 11541 S. Champlain Avenue, Chicago 28, Ill., has introduced Brilliant Toning Red "CP 1269," claimed to be the strongest non-resinated pigment of this type on the market. This non-bleeding azo pigment, based on beta-oxy naphthoic acid, is of the type commonly known in the trade as Permanent Red 2 B. CP 1269 is an easily dispersible pigment that exhibits no migration, crocking or bleeding in plasticizers, water or solvents. It is said to maintain its brilliant shade even after exposure to high heat.

LABOR NOTES

The International Policy Committee of the United Rubber Workers, A.F.L-C.I.O., has gone on record for a "gradual transition" to a uniform eight-hour day and five day-week. Outside Akron, the union's members already are on such a schedule. Since the early 1930's, however, with the exception of the war years, the Akron union members, now numbering more than 40,000, have been on a six-day, 36-hour week. It was originally installed as a means of spreading work. Most Akron rubber plants are now working four six-hour turns daily. Going to an eight-hour day would put the plants on a three-turn basis.

The six-month old strike of Local 65, U.R.W., against the Gro-Cord Rubber Co. of Lima, Ohio, came to an end on March 3 when representatives of the company and union signed a new contract to run through December 31, 1957. The agreement provides a plant average pay rate of $1.80 per hour, 16c less than the $1.96 average before the strike. Two 5c hourly raises are provided, one next July 1 and another July 1, 1957. Two other key provisions, both new to the contract, are a no-strike, no lockout clause, and a provision that any part of the contract can be amended by mutual agreement of the union and the company during the life of the pact. The main issue in the strike had been contract security provisions rather than wages. The union earlier had agreed to a wage cut to help the company maintain a competitive position in the heel and sole industry.

Goodyear Paint Literature

The Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has set about the publication of new technical literature about the company's paint materials. The subject material is organized and written for technical personnel. It is edited, written and printed in a style most conducive to rapid communication. The company has made available a handy, loose-leaf "Tech-Book" binder in which pertinent bulletins can be kept.

"The boss paid extra for this new mixer —it plays a 'Strauss waltz' every time you mix a batch!"

Riviclor Rigid Vinyl Pipe

The American Hard Rubber Co., 93 Worth Street, New York 13, N. Y., has introduced "Riviclor," a new rigid pipe extruded of high-strength polyvinyl chloride, said to offer a combination of chemical resistance, high bursting strength and toughness. Riviclor is claimed to be completely resistant to many chemicals, including troublesome organics. Impact strength is as high as 2.5 (Izod), and the material remains tough and non-brittle even at sub-zero temperatures. It is also claimed to be resistant to weather and aging, electrolytic corrosion, fungus and bacteria, and does not require painting. Riviclor is non-toxic, inert, odorless and tasteless. It is a good electrical insulator, non-flammable and self-extinguishing. The inside surface is said to reduce heat loss and permit a greater flow than equivalent size steel piping. Abrasion resistance is good. Riviclor pipe and fittings are now available in sizes from ½ to 2 inches, standard or extra heavy wall construction (schedules 40 and 80 IPS). Working pressure of the ½ inch extra heavy pipe is 490 psi., and that of the 2 inch extra heavy pipe is 255 psi., at 70°F. Though recommended maximum pressure decreases as the temperature goes up, under most conditions, the pipe can be used safely and will retain rigidity at temperatures as high as 160°F. Diaphragm valves are also available with all-Riviclor body, sizes ½ to 2 inches, and welded tank liners and special fabricated equipment are offered in Riviclor.

Ice-Resistant Lubricant

The Naval Research Laboratory reports that it has developed a rubber-compatible semi-fluid grease designated as "GLT-700-60" which may have a wide range of applications where icing occurs. Essential features include proper balance of selected esters and silicone oils to control rubber swell, a 25% concentration of low volatile material to prevent drying out during hot periods, addition of rust inhibiting and anti-wear additives, and thickening with lithium soap to assure lubricant retention in films of useful thickness, while maintaining a very low viscosity at —65°F. Copies of PB 111739, "The Development of a Rubber-Compatible and Ice-Resistant Lubricant for Aircraft Ordnance", may be obtained for $1.25 each from the Office of Technical Services, Washington 25, D. C.

Expanding Niagara Falls Plant

Stauffer Chemical Co., New York, N. Y., has announced that it plans to invest a million dollars in an expansion and modernization of its Niagara Falls, N. Y. plant. About $400,000 of the total new investment will be for additional facilities to manufacture 73% caustic soda. Approximately $150,000 will be spent to increase output of chlorinated solvents. The company also plans to extend and improve several existing plant units which are now producing chlorine, caustic soda, titanium tetrachloride, silicon tetrachloride and zirconium tetrachloride. Work on the additions is now in progress. It is anticipated that they will be in operation by late summer.

Sealed-Aire Tubeless Tire

A bullet-sealed inner tube construction that the Seiberling Rubber Co. created exclusively for U. S. Army combat vehicles in World War II, has been adapted in a tubeless tire for the first time and is now available nationally to both new and used car owners, according to J. P. Seiberling, president. The tire contains a built-in, automatic puncture-sealant held permanently in place by an exclusive "bulkhead" construction which provides lifetime tire balance. According to Mr. Seiberling, while some tubeless tires have a puncture-sealing gum in the tread area, the problem has always been that the combination of high speed and excessive heat would cause the gum to bunch and lump up, reducing the effectiveness of the gum and throwing the wheel out of balance.

He pointed out that the new tire, called "Sealed-Aire", is different from others in that the live rubber cells built into the crown of the tire cover the full tread area, prevent flowing and shifting of the sealant, eliminate out-of-balance conditions and give maximum puncture-sealing protection for the full life of the tire. E. H. Gibbs, development manager, who invented the sealant construction, said the gum cannot be thrown to the center of the tread by centrifugal force as the car rolls at high speed, or flow to the bottom when the car stops. More than five years of laboratory research and a million miles of road-testing were required before the company was able to put the tire in volume production for the civilian market, it is said. "Sealed-Aire" is made of nylon cord construction, with an extra nylon breaker ply under the tread to give it added strength. A special siped rib-type tread is said to be quieter on the road than conventional treads and the tire shoulder has the company's patented "heat vents", designed to reduce running temperatures.

Granted Metallizing License

Dobeckmun Co., Cleveland, Ohio, has been licensed to conduct operations under patents owned by the National Research Corp., Cambridge, Mass., relating to continuous vacuum metallizing. The processes made available to Dobeckmun are the result of work by National Research directed toward the development of techniques and equipment for the continuous metallizing of plastics, paper, textiles and other material with a variety of metals, including copper, zinc and aluminum. Among the best known of Dobeckmun products are the metallic yarns sold under the "Lurex" trademarks. Dobeckmun will use the licensed process principally for the production of its newest and patented product, "Lurex MM," made from metallized "Mylar" polyester film. Under the terms of the license agreement, Dobeckmun has full access to developments of National Research relating to continuous metallizing of plastics and the right to operate under both present and future patents.

Goodrich-Gulf Promotes Miller

J. Ernest Miller

J. Ernest Miller, formerly sales manager for Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has been named vice-president in charge of sales. Mr. Miller joined the company in April, 1955, after serving as defense contact coordinator for the B. F. Goodrich Chemical Co. A graduate of Wooster College, Mr. Miller joined Goodrich in 1933 as a production employee. He held various factory positions, including shift foreman, and in 1942 was transferred to the Lone Star bomb and shell loading plant in Texarkana, Texas, operated for the government by Goodrich, as auxiliary loading superintendent. In 1943, Mr. Miller became production manager of the synthetic rubber plant at Port Neches, Texas, becoming plant manager there in 1944. In 1952, he was loaned to the government as deputy director of the Office of Synthetic Rubber. After seventeen months of government service, Mr. Miller returned to Goodrich Chemical as defense contact coordinator, a post he held until he moved to Goodrich-Gulf in 1955.

Develops Two Pine-Gum Products

Naval stores researchers of the U.S. Department of Agriculture at Olustee, Fla., have developed two new chemical products of pine gum that are now available commercially for industrial use. One product, maleopimaric acid, is the first industrial chemical to be made directly from pine gum. It is being used in applications requiring a plasticizer, emulsifier or resin. The other pine-gum derivative, pinane hydroperoxide (PHP), is a catalyst for cold rubber production, with applications also in the production of some plastics. The new process for the production of maleopimaric acid yields rosin of better-than-ordinary quality and turpentine as by-products. Conventional gum-processing equipment and operations can be adapted for recovery of the acid as an intermediate step in turpentine and rosin production. Although present output of these two chemicals is limited, the Distillation Products Division, Eastman Kodak Co. has recently added maleopimaric acid to their stock of organic chemicals, and the American Cyanamid Co. has indicated that it can supply experimental quantities of PHP.

To Award Summer Fellowship

Columbia-Southern Chemical Corp., Pittsburgh, Penna., at the dedication of its new multi-million dollar research and development center at Natrium, West Va., disclosed a new program to stimulate local high school science teachers in acquiring advanced education in their fields. Initially, the program will make available summer fellowships toward advanced degrees for the teachers of chemistry, physics and mathematics at Magnolia High School in New Martinsville, West Va. Many children of employees at the firm's Natrium plant attend this school. According to E. T. Asplundh, president of Columbia-Southern, "It is the corporation's desire to give teachers an opportunity to keep pace with the latest developments so that they in turn may stimulate students to choose science careers right here in the rapidly expanding 'Chemical Center of America,'—the Ohio River Valley."

He stated that teachers at Magnolia High School who have been teaching at least three years, who are certified to teach the science subjects, who are devoting at least 50% of their teaching time to these subject fields, and who are interested in pursuing a regular summer academic program leading to a master's degree in science or education, will be eligible for these fellowships. "Each award will amount to $500 plus tuition at an accredited institution of the teacher's own choosing. The company wants to give candidates who start this program an opportunity to complete requirements for their master's degrees, so this same award will be made for three successive summer terms if that much time is required for the candidate to finish his work", Mr. Asplundh said.

New UC Silicone Compound

Silicones Division of the Union Carbide and Carbon Corp., New York, N. Y., has announced the development of "X-1034R", another general purpose silicone rubber compound. What is claimed to be one of the outstanding features of X-1034R is that it fully meets the requirements of Aeronautical Materials Specification 3301B, something no previously available compound has been able to do. Fabricators can now manufacture parts to this specification without compromising on properties or obtaining waivers from customers. X-1034R has shown excellent resistance to high temperatures, very low compression set, low moisture pickup, and ease of handling. It is a red-colored, 40 Durometer hardness material that can be molded, extruded or calendered with conventional or special catalysts. Combined with di-*tertiary*-butyl peroxide, it can also be satisfactorily used for thick sections. Normally shipped from the plant at Tonawanda, N. Y., uncatalyzed, so the fabricator can select the catalyst best suited for his purpose, it is also supplied in catalyzed form on special order.

Want to make your opinion known? Write a letter to the editor! (See page 206.)

Names in the News

HARVEY S. FIRESTONE, JR., chairman of the board of the Firestone Tire & Rubber Co., Akron, Ohio, has been presented with the annual Brotherhood Award of the National Conference of Christians and Jews.

H. F. WAKEFIELD, manager of the Industrial Products Division of the New Product Development Department, Bakelite Co., has received an honor scroll from the New Jersey Chapter of the American Institute of Chemists in recognition of his professional activities.

CLARENCE FRANCIS, former president and chairman of the board of the General Foods Corp., has been elected a member of the board of directors of the U. S. Rubber Co.

DR. ROBERT A. WINTERS, executive director of the Rubber Heel and Sole Institute, is serving as secretary of the Princeton University and University of Pennsylvania Administrative Committee to oversee the building of a giant new synchrotron at Princeton.

ARTHUR R. BUSH, associated with the B. F. Goodrich Co. since 1940, has been named product manager of the Sundries Department, B. F. Goodrich Industrial Products Co., Akron, Ohio.

C. A. MACKINTOSH, formerly sales manager of the Sherwood Refining Co., has joined the Westwood Chemical Co. as sales representative in the eastern territory.

J. P. SEIBERLING, president of the Seiberling Rubber Co., was recently honored at a special luncheon marking his completion of 25 years' service with the company.

LELAND E. SPENCER, vice-president of the Goodyear Tire & Rubber Co., Akron, Ohio, has been named executive reservist with the Office of Defense Mobilization, Washington, D. C. This is Mr. Spencer's fourth government assignment.

FRANK J. MCGRATH, treasurer of the U. S. Rubber Co., New York, N. Y., has been elected to membership in the Controllers Institute of America.

DR. GEORGE W. HOWARD, a reserve colonel, has been promoted to fill the newly created position of technical director at the Corps of Engineers' Research and Development Laboratories, Fort Belvoir, Va.

E. RABUN SWINT, formerly director of education and assistant to the vice president, industrial relations, at the Glenn L. Martin Co., Baltimore, Md., has been appointed manager, Executive Development for the Dyestuff and Chemical Division, General Aniline & Film Corp., New York, N. Y.

WILLIAM R. BLAKE, associated with the B. F. Goodrich Co. since 1937, has been named general manager of the International B. F. Goodrich Corp., San Juan, Puerto Rico.

DANIEL H. LIPMAN, vice-president and sales manager of Stein, Hall & Co., has been elected a director of the company.

W. A. PATTERSON, president of the United Air Lines, has been elected a director of the Goodyear Tire & Rubber Co.

THOMAS C. WILLIAMS, previously associated with the Okonite Co., has joined the product development section of the Silicones Division, Union Carbide and Carbon Corp., Tonawanda, N. Y.

WILLIAM J. MALVEY, associated with the Scovill Manufacturing Co. since February, 1953, has been transferred to New York as a sales representative for industrial hose couplings, Merchandise Division.

C. LYNN FROST, formerly manager of sales promotion and advertising for the Foam and Floor Products Divisions of Hewitt-Robins, Inc., has been appointed regional sales manager for the Foam Products Division with headquarters in Chicago, Ill.

CARL J. MCNALLY and EDWARD C. CAMPBELL have been named assistant tire sales managers of the Dunlop Tire and Rubber Corp.

MRS. F. P. LEACH has been appointed secretary of the Passaic Rubber Co., Clifton, N. J., succeeding ARTHUR R. PARTINGTON. Mr. Partington retains the post of treasurer with the company.

LOUIS E. BENTON, formerly sales manager of Acadia Synthetic Products Co., Chicago, Ill., has been appointed sales manager of the Rubber Division of the Phoenix Manufacturing Co., Joliet, Ill.

S. T. WILLIAMS, general manager of A. Schrader's Son Division, Scovill Manufacturing Co., Brooklyn, N. Y., has been named a director of the parent company.

WILLIAM WHITE, in charge of Canadian sales for the I. B. Kleinert Rubber Co., has been elected a director of the company.

WILLIAM J. CANAVAN, associated with the Bakelite Co. since 1944, has been named manager of the Extrusion Materials Division.

J. M. LINFORTH, vice-president of the Goodyear Tire & Rubber Co. in charge of manufacturers' and government sales, has announced his retirement as of this coming June.

ANTHONY D. EASTMAN, formerly vice-president in charge of sales for Congoleum-Nairn, Inc., has been named director of industrial relations of the General Tire & Rubber Co.

J. G. BERRY, formerly automotive engineering manager for the Tire Division of the U. S. Rubber Co., has been appointed director of field engineering for the division.

GERALD J. BAYERN, formerly associated with Foster D. Snell, Inc., has joined the Barrett Division, Allied Chemical & Dye Corp., as marketing and economic analyst.

HERBERT E. PIKE, associated with the General Tire & Rubber Co. since 1946, has been named national manager of Kraft sales and service.

JOHN A. SARGENT, president of the Diamond Alkali Co., has been elected a director of the White Motor Co.

SIR MILES THOMAS, chairman and chief executive of British Overseas Airways Corp., has been elected a director of Monsanto Chemicals, Ltd.

ROBERT G. BURSON has been appointed sales manager of the Industrial V-Belt Division of the Dayton Rubber Co. succeeding J. W. TORRANT who is entering business for himself in the New England area.

PHILIP M. DINKINS, vice-president in charge of operations for the Dyestuff and Chemical Division of the General Aniline & Film Corp., has been elected a member of the company's board of directors.

THOMAS P. MCGUINNESS, associated with the Barrett Division, Allied Chemical & Dye Corp., since 1945, has been named supervisor of engineering, chemical products.

WILLIAM J. ROEMER has been appointed director of purchases for the Acushnet Process Co., New Bedford, Mass. CHARLES R. HINKLEY, formerly buyer, has been named purchasing agent.

W. F. TWOMBLY, vice-president of the Witco Chemical Co., has been appointed as a consultant on organic chemicals in the Chemical and Rubber Division of the Business and Defense Services Administration, Department of Commerce.

HARRISON C. GIVENS, JR., former manager of the Manufacturing Department, Textile Division, Celanese Corp. of America, has been made vice-president in charge of operations of the Celanese International Corp.

DICK VOELZ has been appointed a sales engineer for the Hull Standard Corp., Abington, Penna. He will concentrate on the company's line of "Standard" semi-automatic and completely automatic molding presses in the Wisconsin, Illinois and Indiana territory.

New G-E Silicone Compounds

Three entirely new silicone rubber compounds featuring the same shrinkage as organic rubbers as well as low compression set properties without toxic additives have been announced by the Silicone Products Department of the General Electric Co., Waterford, N. Y. The three new compounds also boast shorter cure times than previous low compression compounds. Designated "SE-361," "SE-371," and "SE-381," these silicone rubbers are the first to achieve the same shrinkage as organic rubber, permitting the molding of silicone rubber parts in the same molds used for organic rubber products. The new low shrinkage also makes possible the production of silicone rubber parts to closer tolerances than ever before.

Because these improved Class 300 silicone compounds are the first to achieve low compression set without toxic additives, they promise reduced costs and ease of handling. Costly equipment formerly needed to remove poisonous vapors will no longer be necessary in fabricating plants. Another cost saving feature of the Class 300 rubbers is the properties they attain after cures as short as one hour at 300°F. In some cases the one hour cures produce properties attained by other low compression stocks only after extended curing periods, the company states.

In addition to making possible wider use of equipment because of their short curing features, the Class 300 compounds can be cured equally well by mold, hot air vulcanization or steam curing methods. Added features of the Class 300 low compression set products are their ability to take Teflon readily, oil resistance equal to that of old mercury stocks, low moisture absorption, and excellent processing characteristics, G-E states.

T-190 Tire Again Produced

Seiberling Rubber Co., Akron, Ohio, has scheduled for production its "T-190" passenger tubeless tire, a premium white sidewall tire with nylon cord construction. The tire was discontinued last summer to make way for increased production of the Seiberling Sealed-Aire tire, a premium tire featuring puncture-sealing bulkhead construction. The T-190 tire has the same quality and design as the Sealed-Aire tire, but without the bulkheads. The T-190's tread design uses "Y" shaped stop-slots for improved traction, and round "silencer" blocks are built into the outer tread grooves. This design not only improves traction but also reduces noise and "squealing" on turns because the silencer blocks prevent excessive tread vibration which causes tires to squeal, Seiberling claims. T-190 is produced in sizes 6.70-15 through 8.20-15.

A newly-issued catalog by the Parker Appliance Co., Cleveland, Ohio, lists cross references charts of size numbers with dimensional data for all company O-rings for sealing applications. Ask for Catalog 5701.

de Decker Joins U. S. Rubber

Dr. H. C. J. de Decker

Dr. Hendrik C. J. de Decker, former research director for Rubber-Stichting, Delft, Holland, has joined the Research and Development Department staff of the U.S. Rubber Co., New York, N.Y. The company has also announced the appointment of Dr. Fedde H.D. Akkerman and Dr. Sjirk van der Burg, who were also associated with Rubber-Stichting, to the Research and Development Department. Dr. de Decker was research director of the Dutch institute for six years before he left to join U.S. Rubber. Prior to that time, he was with Royal Dutch Shell Petroleum Co., where he was head of corrosion research and later a refinery section head. He was also previously associated with the Netherlands Organization for Applied Scientific Research. He earned his doctorate degree at the University of Utrecht. Dr. Akkerman was on the Rubber-Stichting staff for three years and before that was a high school chemistry teacher. His doctorate degree is from the University of Groningen. Dr. van der Burg joined Rubber-Stichting in July, 1955, after getting his doctorate degree at the University of Groningen.

Appointed U.S. Distributor

Whittaker, Clark & Daniels, Inc., New York, N. Y., has been named sole distributor of Reckitt's "Seagull" ultramarines in the United States. Reckitt is widely-known throughout the world as a producer of ultramarine blue for diversified industrial use. Their entry into the U.S. market of industrial type blues, under the "Seagull" trademark, is a new venture. Seagull brand blues are available in a wide range of ultramarine shades extending from the brilliant blues through the delicate violets. The color characteristics of these ultramarines are said to match those of the native lapus lazuli with amazing fidelity, and to possess a purity of shade and permanence or fastness to light, which offers important advantages in industrial application. Distribution by Whittaker will embrace the rubber, plastics, paint and other industries.

Take a long time for this copy of RUBBER AGE to reach your desk? Use the coupon on page 365.

American Cyanamid Promotes Two

American Cyanamid Co., New York, N. Y., has announced the appointment of Dr. Richard O. Roblin, Jr., as assistant general manager of the Pigments Division and the appointment of Dr. Robert F. Parker as assistant general manager of the Research Division. Dr. Roblin, formerly assistant general manager of the company's Research Division, has been with Cyanamid since 1934 when he joined the Warners, N. J. plant as a research chemist. In 1936 he was appointed a group leader at the Stamford Laboratories, becoming director of its Chemotherapy Division in 1942. He was appointed assistant manager of the Research Division in 1954. Dr. Roblin is a graduate of the University of Rochester and holds M.A. and Ph.D. degrees in chemistry from Columbia University.

Dr. Parker, who was formerly director of research at the Pearl River Laboratories, joined the Cynamid organization in 1933. As a chemist at the Bound Brook plant, Dr. Parker did considerable work in the fields of dyes and pigments. In 1947 he was appointed director of chemical research at that plant and in 1952 became director of research. He was appointed director of research at Pearl River in August, 1954. Dr. Parker received his B.A. and M.A. degrees from Williams College and in 1933 received his Ph.D. in chemistry from Yale University.

To Triple Isocyanates Plant

Mobay Chemical Co., St. Louis, Mo., has announced that its new isocyanates plant at New Martinsville, West Va., completed only a few weeks ago, will be tripled in size as rapidly as engineering and construction can be completed. Construction of the present plant started in January, 1955, and was completed early in February, 1956. Some units of the new plant went into production last November. Engineering for the additional facilities is now more than 50% complete. When the expansion is completed, the plant will be the largest in this country for the production of isocyanates and polyesters. The New Martinsville plant now has a monthly capacity of several hundred tons of isocyanates and comparable amounts of polyesters. Almost 200 persons are now employed at the plant, including more than 50 in the Research Department.

Personnel Changes at Flintkote

Flintkote Co., New York, N. Y., has announced the election of Dennis J. McNamara as vice-president and controller. William Feick, Jr., has been elected treasurer. Mr. McNamara has been with the company since 1920, and has served as assistant treasurer since 1939. Mr. Feick comes to Flintkote after five years with the Crocker-Anglo National Bank of San Francisco, Calif., where he was assistant vice-president. The company has also announced the election of H. L. Evans, vice-president in charge of manufacturing, and George K. McKenzie, vice-president and secretary, as directors.

Financial News

U.S. Rubber Company

Quarter to March 31: Net profit of $9,103,348, which is equal to $1.44 a share of common stock, compared with $9,940,276, or $1.63, for the corresponding period of the preceding year. Net sales for the first quarter amounted to $229,649,654, against $225,161,081 in the first quarter of 1955. Current assets on March 31 were $419,131,783, compared with $366,470,529 a year ago. Current liabilities were $135,944,690, compared with $131,687,788. Net quick assets were $283,187,093, compared with $234,782,741.

B. F. Goodrich Co.

Quarter to March 31: Net income of $10,082,972, which is equal to $1.14 a common share on 8,879,186 shares outstanding, compared with $9,840,528, or $1.12 a share on 8,819,766 shares, in the corresponding period of the preceding year. Despite a drop of about $3,000,000 in business with the federal government, net sales rose to $180,295,218, against $178,619,306 for the same 1955 period.

Thermoid Company

For 1955: Net income of $1,614,343, which is equal to $1.88 a common share, compared with $962,617, or $1.06 a common share, in the preceding year. The 1954 net income is before a special charge of $37,182 representing a portion of interest on prior years' Federal income taxes. Net sales in 1955 amounted to $37,270,469, against $30,510,760 in 1954.

Seiberling Rubber Co.

Quarter to March 31: Net income of $176,168, which is equal to 30c per common share, compared with $133,328, or 21c per share, for the corresponding period of the preceding year. Net sales in the three months ended March 31, 1956, amounted to $10,716,356, against $10,054,459 in the first three months of 1955.

Union Asbestos & Rubber Co.

For 1955: Net loss of $270,813, after tax credit of $268,685 and special credit of $33,652, compared with net income of $336,716, which is equal to 71c a share, in 1954. The net income for 1954 is after a special credit of $91,932. Net sales in 1955 amounted to $13,402,136, against $13,649,808 in the preceding year.

American Cyanamid Co.

Quarter to March 31: Net income of $11,208,882, which is equal to $1.17 a common share, compared with $9,453,616, or 99c a share, in the corresponding period of the preceding year. Net sales in the first quarter of 1956 amounted to $118,286,222, against $111,643,065 for the same quarter in 1955.

Firestone Tire & Rubber Co.

Quarter to January 31: Net income of $13,850,000, which is equal to $1.66 a share, compared with $10,800,000, or $1.30 a share, in the corresponding quarter of the previous year. Net sales in the quarter ended January 31, 1956, totaled $264,986,126, 7% more than the $247,790,647 recorded in the quarter ended January 31, 1955.

Pantasote Company

For 1955: Net income of $51,741, in contrast to a loss of $322,047 in the preceding year. The company attributed its rise in income in 1955 to the discontinuance of its unprofitable heavy-gauge vinyl film business and concentration on sales of light film, which increased by more than 25%.

McNeil Machine & Engineering Co.

For 1955: Net income of $2,435,353, which is equal to $4.22 a share, compared with $2,829,148, or $4.90 a share, in the previous year. Net sales in 1955 amounted to $23,748,979, against $24,150,591 for 1954. Backlog on December 31, 1955, was about $16,500,000.

Heyden Chemical Corp.

For 1955: Net income of $1,551,000, which is equal to $1.01 a common share, compared with $698,000, or 35c a common share, in the preceding year. Net sales in 1955 amounted to $24,657,000, against $17,364,000 in 1954.

New Jersey Zinc Co.

For 1955: Net income of $4,826,284, which is equal to $2.46 per share, compared with $3,092,657, or $1.58 per share, in the preceding year. Net sales in 1955 amounted to $20,408,344, against $14,704,391 in 1954.

National Rubber Machinery Co.

For 1955: Net income of $636,249, which is equal to $3.25 a share, compared with $527,489, or $2.70 a share, in the preceding year. Net sales in 1955 amounted to $11,553,876, against $10,240,700 for 1954.

I. B. Kleinert Rubber Co.

For 1955: Net income of $533,057, which is equal to $1.76 per share, compared with $434,562, or $1.44 per share, in the preceding year. Net sales in 1955 amounted to $11,718,528, against $10,693,635 in 1954.

Anaconda Wire & Cable Co.

For 1955: Net income of $7,015,496, which is equal to $8.31 a share, compared with $4,700,215, or $5.57 a share, in the preceding year.

Eagle-Picher Co.

Quarter to February 29: Net income of $2,424,243, which is equal to $2.45 per share, compared with $706,508, or 71c a share, for the corresponding quarter of 1955. Net sales in the quarter ended February 29, 1956, amounted to $29,829,500, against $26,222,019 in the quarter ended February 28, 1955.

Hewitt-Robins, Inc.

Quarter to March 31: Net income of $291,659, which is equal to 90c per share of common stock, compared with $270,076, or 88c per share of common stock, for the corresponding period of the previous year. Net sales amounted to $12,330,697, against $10,515,063 in the first quarter in 1955.

American Enka Corp.

Twelve Weeks to March 31: Net income of $1,082,244, which is equal to 80c a share, compared with $1,554,428, or $1.15 a share, in the corresponding period of the preceding year. Net sales amounted to $14,833,096, against $15,395,485 for the first twelve weeks of 1955.

Industrial Rayon Corp.

For 1955: Net income of $10,681,000, which is equal to $5.77 per common share, compared with $7,405,000, or $4.01 per common share, in the previous year. Net sales in 1955 amounted to $83,658,000, against $65,916,000 in 1954.

United Engineering & Foundry Co.

For 1955: Net income of $2,192,608, which is equal to 87c a share, contrasted with $2,852,372, or $1.14 a share, in the preceding year. Net sales in 1955 amounted to $47,723,198, against $58,068,808 in 1954.

S.S. White Dental Mfg. Co.

For 1955: Net income of $934,154, which is equal to $2.54 a share, compared with $733,758, or $1.99 a share, in the preceding year. Net sales in 1955 amounted to $21,924,036, against $20,280,258 in 1954.

American Hard Rubber Co.

For 1955: Net profit of $952,560, which is equal to $2.91 a share, compared with $551,472, or $1.52 a share, in 1954. Sales in 1955 totaled $22,413,859, against $17,678,982 in the preceding year.

United Carbon Co.

For 1955: Net income of $5,560,201, which is equal to $4.66 a share, compared with $4,656,769, or $3.90 a share, in the preceding year. Net sales in 1955 totaled $50,087,818, against $34,401,333 in 1954.

Thiokol Chemical Corp.

Quarter to March 31: Net income of $156,874, which is equal to 40c a share, compared with $115,214, or 32c a share, in the corresponding period of 1955.

Thompson Announces Retirement

Edgar W. Thompson, whose name has been linked with the manufacture of neoprene since the synthetic rubber was first marketed by E. I. du Pont de Nemours & Co., Inc., in 1932, retired at the end of March after a 36-year career. Mr. Thompson was the first manager of the company's neoprene plant at Louisville, Ky., and prior to that was superintendent of the neoprene area at the company's Chambers Works, at Deepwater Point, N. J. He started with the Newport Co. in 1920, and in 1929 was named assistant general superintendent of manufacture at the Carrollville, Wisc., plant. When Newport was acquired by DuPont in 1931, he was transferred to the Chambers Works as a supervisor, becoming superintendent of the neoprene area in 1939. Late in 1941, he was named manager of the neoprene plant at Louisville, the first plant to be in operation under the government's synthetic rubber program. He continued as manager after the plant was taken over by the government in 1942 and, under his guidance, annual neoprene output was increased from 10,000 tons to 40,000 tons at war's end.

In 1946, he was recalled to Wilmington as production manager of the Rubber Chemicals Division (now the Elastomers Division). He returned to Louisville as plant manager in 1949. In February, 1954, he returned to Wilmington and has since acted as department coordinator of design and construction of the new neoprene plant at Montague, Mich. Mr. Thompson was born July 3, 1895, in Clearmont, Fla. He received his bachelor of science degree in chemistry from Denison University in 1920.

Borden Reswax Concentrates

A new series of wax-polymer concentrates which feature the use of Pliolite with either paraffin or microcrystalline waxes, has been introduced by the Resinous-Reslac Department of the Chemical Division, Borden, Co. Offered under the names "Reswax Concentrates," these coatings are designed primarily for paper converters where low viscosities and high polymer concentration are important. Excellent bond strength, absence of tack and improved adhesion to paper or foil are among its other features, according to Borden's. Reswax users can reduce the concentrates to the desired concentration in their own plants by addition of paraffin or microcrystalline. The new Pliolite Reswaxes further complement available concentrates containing Vistanex, polyethylene, Butyl, S-polymer and other synthetic rubbers and resins.

Expanding Polyester Facilities

Hooker Electrochemical Co., Niagara Falls, N. Y., has announced that it is now doubling the capacity of its "Hetron" polyester resin manufacturing facilities, to be completed by June 1, 1956. It is stated that demand for Hooker's line of eight Hetron resins has risen rapidly and it is indicated that capacity of the present multimillion pound per year plant will be inadequate to meet fabricator's demands for much longer.

Goodyear Promotes Spencer

Leland E. Spencer

Leland E. Spencer, former assistant to the president, has been appointed to the post of vice-president of the Goodyear Tire and Rubber Co., Akron, Ohio. He will direct purchasing, general merchandise and material control, the rubber plantations and rubber purchasing. Mr. Spencer was also named secretary of Goodyear's newly organized policy committee and was made a member of the company's foreign operation policy committee. Mr. Spencer joined Goodyear in 1926, and in 1942 he was granted a leave of absence to serve in the rubber director's office of the War Production Board. Later, he was made deputy rubber director and served until 1945, when he became manager of Goodyear's factory at Topeka, Kan. Recalled to government service in 1947, he served in Germany as administrator of commerce and industry for the American and British zones. Returning to the United States in 1949, he was made a vice-president of Kelly-Springfield Tire Co., Cumberland, Md., a Goodyear subsidiary. He went into government service again in 1951 as chief of the Rubber Division of the National Production Authority, returning to Goodyear in 1952 as assistant to the president.

Cites Air Spring Test Results

L. A. McQueen, vice-president of the General Tire & Rubber Co., Akron, Ohio, recently predicted that the American motorist will be "floating on air" by 1956. Speaking at the company's annual dealer convention, Mr. McQueen unveiled General Tire's newest development, the "General Air Spring" for passenger cars. Resembling a squat-sized tire girded by a steel band, the new air spring created by the company will be installed as original equipment on many 1958 model passenger cars. In a series of recent tests, Mr. McQueen stated, the air spring proved its superiority in a number of ways over the steel springs now used in automobiles. Not only does it provide a softer, more comfortable ride, he stated, but it is safer. The new air spring adds to the car's low, sleek appearance and gives a quieter ride, he declared.

Buys West Coast Company

Barry Controls, Inc., of Watertown, Mass., has arranged to purchase all physical assets of the United States Sheet Metal Products Co. of Burbank, Calif. The acquisition was made to establish a West Coast division for design and production of Barry's shock and vibration mountings for aircraft and missiles. Barry president Ervin Pietz said, in announcing the acquisition, that this West Coast facility "in the heart of our biggest market, the aircraft and missile industry", was the inevitable and important next step in Barry's continuing expansion. "Here is where the biggest portion of the military budget for jets and missiles will be spent. Also, we are becoming more and more directly responsible to the airframe manufacturers for research, prototype design, and production", he said.

Operations at the new plant will include an engineering design section, a shock and vibration test laboratory, a model shop, and production of special designs. The plant is already well equipped for sheet metal fabrication. The purchase, made outright for cash, included production tools, fixtures, office equipment, and lease on the building. The new plant will operate as the Western Division of Barry Controls Inc. Barry's present West Coast engineering office in Los Angeles will be moved into the new division's engineering section. New management personnel will be assigned from the Watertown plant, but additional engineering and production employees will be hired locally.

New Officers for Aetna-Standard

Aetna-Standard Engineering Co., Frick Building, Pittsburgh, Penna., has announced several changes in their official personnel. Mr. E. E. Swartswelter, formerly president, has been named chairman of the board and chief executive officer. Mr. H. G. Coffey succeeds Mr. Swartswelter as president. Other officers appointed include: William Rodder, first vice-president; Glenn W. Garwig, vice-president in charge of sales for the Cold Drawn Division; A. J. Morgan, vice-president in charge of sales for the Flat Rolled Products Division; Frank E. Turner, vice-president in charge of pipe and tube sales; William Jardine, treasurer; and W. W. Wachsman, assistant treasurer.

SPI Plans Largest Exhibition

According to the Society of the Plastics Industry, Inc., New York, N. Y., the Seventh National Plastics Exposition, scheduled to be held from June 11 to 15 at the Coliseum in New York City, will be the largest ever sponsored by the organization. More than 225 individual companies, from all parts of the United States and even from Europe, will participate. It is expected that more than 20,000 representatives of industry and government will attend. SPI also announces that plans for the business and technical conference, which will be held concurrently with the exhibition, are now well under way.

Ontario Sees Technical Films

Over 100 members and guests of the Ontario Rubber Section of the Chemical Institute of Canada attended the April 11th meeting held at the Pickfair Restaurant in Toronto, Ont., Canada. The meeting featured the presentation of two technical films. The first of these was entitled "The Magic Marble", and concerned fiber glass molding techniques. Comments on the film were made by James James of the Fiberglas Co. of Canada. The second film, entitled "Rubber from Rock", covered the story of silicone rubber as prepared by the Dow Corning Corp., Midland, Mich. Comments on this film were made by Robert White of Dow Corning of Canada, Ltd. At the conclusion of the films, W. J. Nichol (Dunlop), chairman of the Nominating Committee and past-chairman of the Section, presented the following slate of officers for the 1956-57 season: *Chairman,* G. Grushcow (Dayton Rubber); *Vice-Chairman,* Wray Cline (Canadian General-Tower); *Secretary,* C. M. Croakman (Columbian Carbon), and *Treasurer,* R. Tartaglia (Goodrich). The following members have been named as district representatives: *Hamilton,* Eugene Eskarvenko (Firestone); *Toronto,* Bruce Williams (Dunlop); *Kitchener,* Ross Smith (Dominion Rubber), and *Representative-at-Large,* Des Seymour (Polymer). The Golf Committee will consist of Lloyd Thomas (St. Lawrence Chemical) and Arthur Luscombe (W. C. Hardesty).

McNeil-Lincoln Merger Set

Plans are now complete for the merger of the Lincoln Engineering Co., St. Louis, Mo., into the McNeil Machine & Engineering Co. of Akron, Ohio. While no purchase price has been disclosed, the merger agreement indicates that McNeil's outlay will be near $11,000,000. This includes the values of the two new preferred stock issues that will be exchanged for Lincoln stock, plus the cash for common shares already purchased. The merger agreement provides that McNeil shall be authorized to issue 150,000 shares of serial preferred stock with an aggregate par value of $6,000,000. It also calls for McNeil to issue 74,946 shares of a new Series A $40 par value preferred in exchange for 74,946 shares of Lincoln Engineering common. In anticipation of the merger, McNeil has purchased the other 47,654 shares of Lincoln common. Lincoln stockholders approved the merger on April 24 and two days later, McNeil stockholders followed suit. McNeil is now the surviving corporation.

Tracerlab Elects Officers

Following the annual stockholders' meeting of Tracerlab, Inc., 130 High Street, Boston, Mass., William E. Barbour, Jr., a principal founder and president since its inception, was elected chairman of the board, and William O. Faxon, formerly executive vice-president, was elected president. The board of directors also elected Malvern J. Gross, currently vice-president and director of engineering of the Ritter Co., vice-president and general manager of the Keleket X-Ray Division. Mr. Gross will assume his duties in the near future.

FINANCIAL BRIEFS

R. S. Wilson, vice-president of the Goodyear Tire & Rubber Co., has acquired 13,570 common shares through stock option, increasing his direct holdings to 13,763. Russell DeYoung, vice-president, has acquired 6,498 common shares through stock option, increasing his direct holdings to 17,498.

Directors of the Armstrong Rubber Co. have voted to split the Class A and Class B common stock into two and one-half shares of new stock for each share outstanding. There now are 534,068 shares of class A common and 53,380 shares of class B. The new shares will be distributed on June 8 to shareholders of record on May 25. The board also voted to call for redemption on May 22 the 5½% subordinated convertible debentures, of which $750,000 are outstanding.

H. R. Ferguson, vice-president of the Thiokol Chemical Corp., has acquired 1,076 common shares through stock option and sold 800, making his direct holdings 2,076. J. W. Crosby, president, has sold 500 shares, reducing his direct holdings to 3,297. S. M. Martin, Jr., vice-president, has sold 600 shares, reducing his direct holdings to 1,899.

J. K. Schneider, vice-president of the General Cable Corp., has acquired 4,000 common shares through stock option, bringing direct holdings up to 12,600.

Edward Lamb Enterprises, Inc., direct and beneficial owner of more than 10% of Seiberling Rubber Co. common stock, has bought 2,553 common shares, increasing direct holdings to 63,831. Indirect holdings total 2,009.

Baird President on Tour

William T. Baird, president of the Baird Rubber & Trading Co., New York, N. Y., accompanied by Mrs. Baird, is now on an extensive trip abroad which will take them to the United Kingdom and most of the principal rubber centers on the Continent. The complete itinerary will take three to four months during which time Mr. and Mrs. Baird will renew old friendships and business contacts. Shortly after Mr. Baird's return to the United States, the company will transfer its general offices from the 16th floor at 233 Broadway, New York City, where it is now located, to the 26th floor of the same structure. The new quarters will provide additional space. All offices will be air conditioned.

Pabco Changes Name

A resolution changing the name of Pabco Products, Inc., San Francisco, Calif., to Fibreboard Paper Products Corp., has been approved by the stockholders, effective May 1. William L. Keady, president, told shareholders that the reason for the change was that, since the acquisition of Fibreboard Products, Inc., in January, sales of paperboard products account for 75% of revenues. He said that Pabco brand names and trademarks would continue to be used.

Poncet Davis Appeal Rejected

A second appeal for review of the conviction of Poncet Davis, president of the Robbins Tire & Rubber Co., Tuscumbia, Ala., for evading $738,249 in income taxes, was turned down on April 23 by the U.S. Supreme Court. As there is no further appeal, Mr. Davis must surrender to federal authorities to begin serving his five-year prison term. He must also pay $40,000 in fines. Mr. Davis is, at this writing, in Akron General Hospital which he recently entered for observation. Hospital authorities reported his condition as "fairly good". He is expected to surrender to federal authorities in Cleveland, Ohio, as soon as he gets out of the hospital. The Supreme Court, in turning down the appeal for the second time, did not agree with Mr. Davis' petition that the government "did not supply the least evidence that the corporation had earnings or profits in any one of the four years embraced by the indictment". Mr. Davis was president, treasurer and sole stockholder of the company from 1945 to 1948, the years involved in the case. Mr. Davis was arrested in 1951 and indicted for income tax evasion about four years ago. In January, 1954, he went on trial and was found guilty of failing to pay $738,249 in taxes on $867,864 of undeclared income from 1945 to 1948. The government charged the income was from Mr. Davis' company, Robbins Tire.

Girdler Promotes Two Engineers

John E. Slaughter, Jr., vice-president of the Girdler Co., Louisville 1, Ky., has announced two promotions in the Votator Division, which he heads. Robert E. Deatz, formerly chief project engineer of the Fats and Oils Section, has been made assistant chief engineer in charge of project and design engineering. Mr. Deatz received his B.S. in chemical engineering at Kansas State College. He joined the Texas Co. as a process engineer in 1942 and became a member of Girdler's technical staff in 1947. Louis P. Bornwasser, formerly associated with E. I. Du Pont de Nemours Co. and the Monsanto Chemical Co., has succeeded Mr. Deatz as chief project engineer of the Fats and Oils Section. He attended the University of Virginia and the University of Louisville, from which he received his B. Ch.E. degree.

Eickmann Named General Manager

Goodyear Tire & Rubber Co., Akron, Ohio, has announced the promotion of E. M. Eickmann from manager to general manager of the company's Aviation Products Division. Mr. Eickmann has been associated with aeronautical activities for more than 27 years. In his new position, he will serve as a member of a new aircraft management committee created by President E. J. Thomas. Function of the group is to oversee operations of the company's extensive aircraft activities. Before joining the Aviation Products Division as an assistant manager in 1950, Mr. Eickmann served the Goodyear Export Co. as manager of its South American aviation business.

New UC Silicone Compounds

Two new silicone rubber compounds which are said to have very good live steam resistance and low moisture absorption have been announced by the Silicones Division, Union Carbide and Carbon Corp., New York, N. Y. Known as "K-1035" and "K-1038", these compounds are recommended for general molding and extruding. Normally, they are shipped uncatalyzed from the North Tonawanda, N. Y., silicones plant in 25 or 50-pound cartons so that fabricators can select the catalyst best suited for individual applications. The compounds may be catalyzed with benzol peroxide, or the new catalyst, di-tertiary-butyl peroxide.

Because of "controlled reactivity" of the gum stock, both compounds have very low compression set without the need for toxic additives. The secret of these and other Union Carbide silicone compounds having "controlled reactivity" is that a controlled number of reactive groups have been actually built into each silicone molecule. They determine the final structure of the cured rubber. K-1035 has a 50 Durometer hardness and K-1038 has a hardness of 80. The fabricator may prepare compounds with intermediate hardnesses of 60 and 70 by blending or they may be specially ordered from Union Carbide as K-1036 and K-1037. The compounds come in neutral and red colors. They are replasticized before shipment, but for best results should be freshened again on a roll mill before using. Catalyzing and freshening can be combined in one operation.

Fisk Safti-Flight Tire

A nylon tubeless tire with twice the strength of ordinary tires, and the first passenger car tire with an eight-ply rating has been announced by the Fisk Tires Division, U. S. Rubber Co., New York, N. Y. The new "Fisk Safti-Flight" is designed to give the extra performance and safety demanded by modern high-powered automobiles on today's highways. A new kind of nylon tire cord, with twice the strength of regular nylon tire cord, is used in the carcass to give eight-ply strength. Cross-slitting in the tread gives the tire improved safety and greater skid resistance, the company states. The design of the tread provides 11,800 edges that open up for road-gripping safety when brakes are applied. The strength of the Safti-Flight doubles resistance to ruptures or breaks that lead to blowouts. Even if sharp objects penetrate the tire the new tubeless construction virtually eliminates the danger of sudden flats, according to the company. The tread is extra deep for high mileage, and the slim white sidewalls are protected from scuffing by a patented curb guard.

Bradley Made Product Manager

Robert G. Bradley, formerly vice-president in charge of sales for the Harris Products Division, Clevite Corp., has been appointed product manager of the Silentbloc and Vibration Department, General Tire & Rubber Co. at Logansport, Ind. Mr. Bradley received his B.S. from Case Institute and also studied at Rollins College and Oberlin Academy.

Blake Named Vice-President

Dr. John T. Blake

Dr. John T. Blake, formerly director of research of the Simplex Wire & Cable Co., Cambridge, Mass., has been named vice-president and plant manager of the company. Dr. Blake, recipient of the Charles Goodyear Medal in 1953, was graduated from Tufts College in 1921 and received his Ph. D. in organic chemistry from the Massachusetts Institute of Technology in 1924. He served as an instructor in chemistry at Tufts, M.I.T., and Northeastern University while studying for his academic degrees. Joining the Simplex company in 1924 as a research chemist, Dr. Blake became director of chemical development in 1935 and director of research in 1940. A former chairman of the Division of Rubber Chemistry, Dr. Blake has also been a national councilor of the American Chemical Society and chairman of the society's Northeastern Section. He has been chairman of the Boston Rubber Group, the Boston Section of the American Institute of Chemical Engineers, the Boston Research Directors Club, and the Subcommittee on Wire Insulation of the American Society for Testing Materials.

Co-editor of the ACS monograph "Chemistry and Technology of Rubber," Dr. Blake has published many scientific articles dealing with the reinforcement of rubber, the thermo-chemistry of rubber vulcanization, the effects of light and ozone on rubber deterioration, the heat of vulcanization of synthetic rubber, water absorption by rubber, and the effect of soil micro-organisms on rubber insulation. He holds patents on the preserving of rubber, rubber coatings on electrical connections, and low plasticity rubber.

Dr. Blake, who was with the War Production Board during World War II, is a fellow of the Institute of Chemists and a member of the American Chemical Society, the Society of the Chemical Industry, the New York Academy of Sciences, the Institution of the Rubber Industry, and the Society of the Chemical Industry of Great Britain.

Issue No. 10 of the Hycar Latex Newsletter published by the B. F. Goodrich Chemical Co., Cleveland, Ohio, covers the subject "Stabilizers for Hycar Latex". Copies are available from the company.

Firestone Scholarship Program

Award of 29 college scholarships to sons and daughters of employees of the Firestone Tire & Rubber Co. in 12 states has been announced by Harvey S. Firestone, Jr., chairman. Mr. Firestone also announced that the scholarship program is being expanded to provide for 20 annual awards, so that 80 students may receive educations under the program each year. Fifteen annual awards were planned when the scholarship program was initiated in 1953. On recommendation of the Scholarship Committee, it was decided to award 29 scholarships this year in order to bring to 80 the number of students enrolled under the scholarship program next September. Including those who have graduated, 92 sons and daughters of employees have won Firestone college scholarships in the four years since the program was adopted. The scholarships provide for full tuition, academic fees, textbooks and a contribution toward living costs. They are renewable annually until requirements for an academic degree are fulfilled, providing satisfactory scholastic standings are maintained and all other qualifications are met. Sixty students have been enrolled in colleges and universities under the program this year.

Introduce New Nitrile Rubber

Following an extensive laboratory and field testing program, a new and improved light-colored nitrile rubber is being released for sale to the rubber processing industry by the Chemical Division of the Goodyear Tire and Rubber Co., Akron, Ohio. Designated as "Chemigum N6B", the new rubber was developed to meet increasing demands by industry for oil-resistant rubbers in applications where color or non-staining properties are of paramount importance. By employing a new and improved antioxidant system, this rubber becomes a non-staining, non-discoloring version of Goodyear's standard Chemigum N6 which is outstanding for its processing characteristics and physical properties, the company states. Both products are essentially equal to physical and gum properties and extremely close in compounded properties before and after aging. Fadeometer exposure of the new rubber, however, shows it to have superior resistance to discoloration. Color characteristics of Chemigum N6B permit its use in light colored applications such as flooring, clear cements and applications where resistance to ultra-violet light of photo-chemical degradation is needed.

Enjay Butyl Bulletins

Enjay Co., Inc., New York, N. Y., has initiated a new series of technical releases giving information on the compounding and application of Enjay Butyl. These new releases, to be called "Enjay Butyl Bulletins" contain up-to-the-minute information on the compounding and application of Butyl. The first two issues of the bulletin have now been made available. Bulletin 1 is on the subject "Factors Affecting the Ozone Resistance of Enjay Butyl Vulcanizates." Bulletin 2 covers "Enjay Butyl Sponge."

Constructing New Lab Center

Construction is now in progress on a new office and laboratory center in Monroe, La., for the Columbian Carbon Co. of New York, N. Y. The three new buildings house operating headquarters for the company's carbon black manufacturing activities in Louisiana, Texas, Arkansas, New Mexico, and Kansas, together with local offices for oil and gas operations, Southern Gas Line, Inc., Pineville Gas Co., and timber and farm operations in the area. The three buildings will be connected by covered walkways, and the project provides ample off-street parking space for employees and for visitors. The buildings will have a total floor area of 25,000 square feet, and the project will represent an investment in excess of $350,000 when completed.

The office and engineering building is a two-story structure, and will include 34 offices, 4 engineering drafting rooms, an 18 foot by 27 foot lounge, a 23 foot by 34 foot library and conference room, a reception room, storage and service rooms. The Rubber Laboratory Building is a single story structure and includes a compounding room with facilities for mixing carbon black, rubber and other ingredients required to make up test compounds, a remilling room, a curing room for vulcanization of rubber compounds, a testing room with latest equipment for physical testing of rubber products, and rooms for offices, storage and service facilities. The Chemical Laboratory Building is also one story and will include laboratories for chemical and physical testing of carbon black, a gas analysis laboratory, a dark room, facilities for water analysis and special studies, offices, storage and service facilities. The construction is brick and tile and the buildings will be completely air conditioned. Construction will be completed about October 1, 1956.

Baker Mold Release Agent

"Dispersion 33," a new product recently announced by the Baker Castor Oil Co., New York, N. Y., is an aqueous suspension of a high melting, non-toxic synthetic wax. It wax component shows a wide range of compatibilities with resins, other waxes and miscellaneous materials, and is largely insoluble in solvents. Dispersion 33 is said to be a convenient means of utilizing the excellent lubricity, anti-blocking and solvent resistance properties of the hard, brittle, sharp melting, fast-setting wax which comprises 33% of this product. Used as a mold release agent on heated molds, it has proven more effective than silicone spray both in mold release properties and in permitting a greater number of runs before mold relubrication. Dispersion 33 may be incorporated in synthetic resin emulsions, rubber and vinyl latices and other water-based systems for anti-blocking, anti-tack, oil resistance, and other effects. Or it can be used—with or without modification by compatible materials in emulsion form—to impregnate paper, cotton and other porous materials.

One-Week Elastomers Course

The Institute for Rubber Research and the Department of Chemistry of the University of Akron, Akron, Ohio, will offer this summer a special intensive course on elastomers for a small group of scientists and engineers employed in industry and business. The course will be limited to 25 persons, and will be given from June 11 to 16. Lectures will be given from 9:00 A.M. until noon and from 6:30 to 8:30 P.M. Laboratory meetings will occupy the afternoons from 1:30 to 4:30 P.M. All meetings will take place in Knight Hall on the University Campus. The fee for the course is $150. Information may be obtained from the Evening and Adult Division, University of Akron, Akron 4, Ohio. The following course schedule has been announced:

June 11—"New Knowledge About Hevea Latex" by G. Stafford Whitby, professor emeritus of rubber chemistry, University of Akron; and "Chemistry of Synthetic Rubbers" by Maurice Morton, professor of polymer chemistry and director of Institute of Rubber Research, University of Akron.

June 12—"Chemistry of Synthetic Rubbers" (Cont'd.) by Maurice Morton.

June 13—"Degradation and Stress Relaxation of Elastomers" by James P. Berry, research chemist, British Rubber Producers' Research Association. (Presently postdoctoral fellow at University of Akron).

June 14—"Physical Behavior of Elastomers: Elasticity, Abrasion and Tear" by Alan G. Thomas, research physicist, British Rubber Producers' Research Association. (Presently research fellow at Brown University).

June 15—"Physical Behavior of Elastomers: Tensile Strength and Reinforcement" by G. Russell Taylor, research engineer, Westinghouse Electric Corp., Pittsburgh, Penna.

June 16—"Chemistry of Vulcanization" by Maurice Morton.

Arabol Buys Resin Formulas

Arabol Manufacturing Co., New York, N. Y., has purchased from Dewey & Almy Chemical Co., a division of W. R. Grace & Co., its formula for making resin emulsion adhesives. Arabol is a producer of all types of industrial adhesives.

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Goodyear Research Appointments

Dr. H. J. Osterhof, director of research, Goodyear Tire & Rubber Co., Akron, Ohio, has announced six new appointments to the Research Division. Dr. Gordon S. Trick, previously associated with the Suffield Experimental Station, Ralston, Alberta, Canada, has joined the diene synthetic rubbers section. Dr. Trick holds a B.S. and a Ph.D. in chemistry from McGill University and an M.S. from the University of Western Ontario. He also completed post-doctorate work at the University of London. Another new member of the diene synthetic rubbers section is Dr. Emanuel Schoenberg, formerly associated with the Massachusetts Institute of Technology. Dr. Schoenberg received his Ph.D. from the University of Turin, Italy, in 1951. He is a member of the American Chemical Society. Dr. Herman V. Boenig, who was associated with a paper manufacturing firm in Sault Ste. Marie, Ontario, Canada, has been appointed to the organic research department. Dr. Boenig was awarded a B.S. in chemistry and physical chemistry, an M.S. and Ph. D. by the University of Heidelberg in Germany. His post-graduate work was in physical and organic chemistry. Dr. Boenig is a member of the American Chemical Society.

Most recent member of the process engineering section is Mrs. Nan Jones, who was associated with St. Thomas Hospital, Akron, before joining Goodyear. Frank Stefan, an employee of the Goodyear Aircraft Corp., Akron, since 1952, has transferred to the process engineering section of the Research Division. Mrs. Elma Maxson Charlton, who left Goodyear in 1954 after nine years service, has rejoined the firm.

Phillips Natural-Like Rubber

Development by the Phillips Petroleum Co. of a new synthetic rubber, *cis* 1,4 polybutadiene, is said to give promise of providing an economical alternate for natural rubber in many of its uses. Phillips scientists have developed a process which will produce this polymer in high yields. Heat build-up of *cis* 1,4 polybutadiene in the Goodrich flexometer is 20°F. below that of standard GR-S cold rubber. The resilience is 10 to 15% better than GR-S and the freeze point is about —160°F., some 90° better than GR-S. Unlike emulsion polymerized polybutadiene, the new rubber is easily compounded by standard techniques and has an excellent balance of other physical properties. Infrared studies have confirmed that the material is better than 90% the *cis* 1,4 polymer with minor amounts of *trans* 1,4 and 1,2 addition.

A modification of the process produces a *trans* 1,4 polymer which is a high-softening-point (greater than 300°F.) resin with many potential uses, the firm states. In addition to the synthesis of *cis* 1,4 polisoprene, the synthetic counterpart of natural rubber, Phillips researchers have synthesized *trans* 1,4 polyisoprene which is the synthetic counterpart of gutta percha and balata. The economics of this latter development may open up new uses for this material, which has been expensive to obtain from natural sources. It is of considerable technical interest that the catalysts systems employed are stereospecific or "directive" in action.

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West Coast News

Wesley H. De Sellem, former vice-president and treasurer of the Pacific Tire and Rubber Co. of Oakland, Calif., has been appointed treasurer of the W. J. Voit Rubber Corp. of Los Angeles. Mr. De Sellem, a native of Colorado and a graduate of the University of California, served the Pacific Tire and Rubber Co. in his dual capacity for more than seven years.

Mr. De Sellem is a Certified Public Accountant and a member of the Controllers Institute of America, serving as a director of the San Francisco chapter; and of the American Institute of Accountants. He is also a member of Delta Sigma Pi, national business fraternity, and Beta Gamma Sigma.

Stillman Rubber Co., Culver City, Calif. has acquired the Tele-Muff Co. of San Fernando, Calif., manufacturer of polyvinyl specialty products, Harold W. Sears, president announced recently. Operated as the Tele-Muff Division of Stillman, the company manufactures and sells nationally a foam vinyl plastic telephone attachment.

The transaction is the second acquisition in recent weeks by the rapidly expanding rubber firm. The company recently acquired Extruded Products Co. of Fullerton, Calif.

M. W. Kellogg Co. has announced the establishment of a western regional office with headquarters in San Francisco's Russ Building. Kellogg is a subsidiary of Pullman, Inc. Sales vice-president Russell J. Wolf said that William R. Dunn, formerly Pacific Coast manager of the Elliott Co., has been named sales manager of the new office. His assistant will be Paul S. Jones, of Salt Lake City, Utah, a 1951 McMullen Scholarship graduate of Cornell University.

According to Mr. Wolf, the new office will give Kellogg's western clients closer liaison with the company's research, development and engineering facilities on the East Coast. Mr. Dunn, who has had a long association with the oil and chemical industries on the West Coast, was graduated from the University of California in 1928. Both he and Mr. Jones are licensed professional engineers.

Stauffer Chemical Co. has announced plans to build a new sulfuric acid plant, which will cost approximately $2,000,000 at Dominquez, Calif. Construction will begin within a few weeks, with full-scale production scheduled early in 1957. The company decided to invest in the new project, according to Hans Stauffer, president, "because of the current and anticipated expansion of Southern California's industrial needs for acid." Stauffer Chemical has, at present, three sulfuric plants in California at Richmond, Vernon and Dominques.

The recent upswing in the development of polyurethanes, a class of chemicals used to produce superior rubber-type products, plastic foams, adhesives, molding materials and protective coatings was described at the March 28th West Coast meeting of the Society of the Plastics Industry, Inc., at San Francisco, by Dr. Richard B. Greene, Coordinator for Plastics and Resins, Barrett Division, Allied Chemical and Dye Corp.

Noting that the primary development of polyurethanes had forged ahead in the field for plastic foams, Dr. Greene said that production is expected to reach 100,000,000 pounds by 1960. He stated that in the field of adhesives, polyurethanes have been combined to adhere successfully to almost any kind of surface, showing promise for the solution of difficult adhesion problems such as metal-to-metal bonding in low-temperature applications.

The versatile polyurethanes are capable of being used to produce protective finishes of superior wearing qualities, Dr. Greene declared. He pointed to the superior drying time, hardness and gloss exhibited by finishes compounded from urethane oils, or urethane alkyds. Their excellent dielectric properties make such applications as wire coating and insulation probable, Dr. Greene predicted. Other likely applications are in can coatings, protective coatings for magnesium, iron, and zinc, and coatings for textiles.

The advent of commercial quantities of this material should serve as a great stimulus to chemists, Dr. Greene said. He forecast that the final products of urethane resin research will probably be dramatically different, bearing little in common with the products now being made. He explained that this was the result of the molecular structure of the substance.

Dr. Greene noted that work had been performed in this field almost twenty years ago. Patents covering the field were granted in the U. S. fourteen years ago, yet only a handful of chemists had even read about the earlier work for most of this period, he said. Only in the last 5 years has the field been opened up for extensive exploration and development.

Bauer & Black Plans New Plant

Bauer & Black, a division of the Kendall Co., Chicago, Ill., has purchased property in Kentucky for an industrial tapes plant which is expected to triple the firm's production. A spokesman said a 76-acre site has been obtained at Franklin, Ky. The purchase price was not disclosed, nor were other details of the purchase. Construction of a two-story plant is expected to begin within a month. The plant will have 35,000 square feet, and will be constructed so that it may be enlarged according to production needs. An initial working force of 100 will be employed. The plant, which will produce industrial tapes, plastic film and other plastic specialties, will be serviced by the Louisville-Nashville Railroad. It will be an air-conditioned structure. The products to be handled by the Kentucky plant now are made in a smaller plant in Chicago.

Appointments at Fort Dunlop

E. A. Murphy

E. A. Murphy, formerly general development manager at the Research Center of the Dunlop Rubber Co., Fort Dunlop, Birmingham, England, has been named director of research in charge of the Central Research Division. Mr. Murphy, who, for his services to the rubber industry, has been awarded the Colwyn Medal by the Institution of the Rubber Industry, joined the Dunlop laboratories during World War I. During his career, he played a prominent part in the development of latex foam rubber. His investigations of synthetic rubber manufacture have led to the project for the large scale manufacture of synthetic rubber in England. Mr. Murphy is on the board of the International Synthetic Rubber Co.

Reed Selected Marburg Lecturer

The American Society for Testing Materials has announced that Charles E. Reed, general manager, Silicone Products Department, General Electric Co., Waterford, N.Y., will deliver the thirtieth Edgar Marburg Lecture at the fifty-ninth annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J. In his lecture entitled "The Industrial Chemistry, Properties and Applications of Silicones," Dr. Reed will discuss the basic chemical structure of silicones with particular reference to their similarities and differences compared with other industrially important polymeric substances and the physical and chemical properties of silicones leading to their industrially important applications. He will then take up processes of manufacture, the important types of silicones and their applications, ending with a look into the future of silicones in selected industries such as electrical, aircraft, protective coating, and textile. Dr. Reed received his B.S. in chemical engineering from the Case Institute of Technology and his Sc.D. at Massachusetts Institute of Technology. He was appointed to his present position in 1952.

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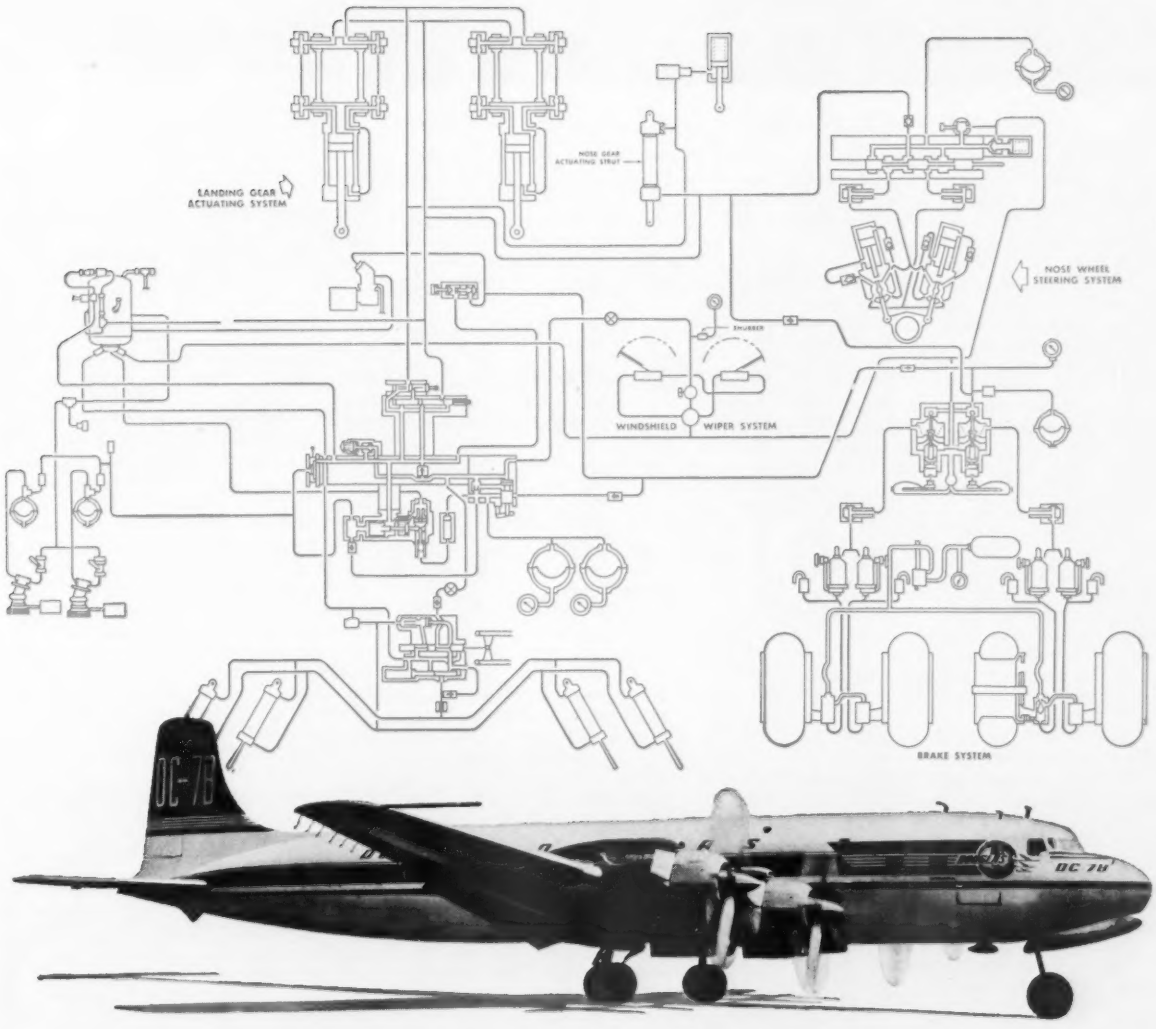

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Canadian News

Construction of Canada's first titanium pigment plant, at Varennes, Quebec, about fifteen miles northeast of Montreal, was begun on April 20 by Canadian Titanium Pigments, Ltd., a subsidiary of the National Lead Co. The plant, located on a 76-acre tract in an industrial area bounded by the St. Lawrence River on the north and by a main highway and railroad on the south, will be built at a cost of $15,000,000. The entire output of titanium pigment will go to Canadian industry.

Approximately 750 workers will be employed at the peak of construction, which will be reached in the fall of this year. Production is expected to begin next year, and the plant will give permanent employment to about 300 people.

The Varennes site was selected by Canadian Titanium Pigments, Ltd. because of its proximity to titanium ore, to railroad and highway facilities, and to ample power and water supplies. Ore will be supplied in the form of slag from the electric furnaces of Quebec Iron and Titanium Co. in Sorel, Quebec, approximately 40 miles downriver from the plant site.

Upwards of 1500 chemists, chemical engineers, and others engaged in kindred activities are expected to attend the 39th Annual Conference and Exhibition of The Chemical Institute of Canada, to be held at the Sheraton-Mt. Royal Hotel in Montreal, May 28-30, 1956. One of the highlights of this Conference will be the presentation of The Chemical Institute of Canada Medal to Dr. Leo Marion, National Research Council, Ottawa, in recognition of his outstanding contribution to chemistry. He will speak on "The Biogenesis of Alkaloids".

Professor Louis F. Fieser, Department of Chemistry, Harvard University, will deliver the Leroy Egerton Westman Memorial Lecture on Tuesday, May 29, and will speak on the oxidation process developed by the late Samuel C. Hooker. "The Significance of the Half-Chair Conformation in Carbohydrate Chemistry" is the subject of the Merck Lecture to be delivered by Professor R. U. Lemieux, Department of Chemistry, University of Ottawa, Ottawa, on Monday, May 28. It will be remembered that Dr. Lemieux received recognition in 1954 for his success in synthesizing sucrose.

The luncheon speaker on May 28 will be Dr. F. C. Pace, Special weapons Section, Civil Defense Health Service Ottawa. The title of his paper will be "Medical Planning in Civil Defense." The exhibition of latest developments in laboratory and chemical process equipment, scientific instruments, chemicals and technical literature, is a principal feature of the Conference. Forty manufacturers and distributors will take part in this exhibition which is the only one of its kind in Canada. Abstracts of the papers to be presented during the meeting of the Rubber Division at the Conference will be found elsewhere in this issue.

Spring floods on the Credit River, described as the worst since 1948, temporarily forced the Western Rubber Co. to halt operations. The sudden rise in the water level was caused by the washout of a bridge, which floated downstream and knocked out a section of a dam above the village. The flood caused $3,000 damage to the rubber plant. The plant is now back in operation.

The Business and Defense Services Administration of the U. S. Department of Commerce in its "Chemical and Rubber" Industry Report, Volume 3, No. 3, observes that recent high synthetic rubber demand both at home and abroad has impelled the Polymer Corp, to expand output greatly. Canadian production of synthetic rubber has increased 150% since 1948 (see table elsewhere on this page). Synthetic rubber consumption, meanwhile, has just about doubled, although total new rubber consumption rose only 35%. On the basis of "calculated" data, Canadian exports of synthetic rubber in 1955 amounted to almost two-thirds of production. Polymer has been able to expand output considerably and has consistently plowed back earnings into new plant and equipment. The accompanying table spells out some pertinent statistics on the Canadian rubber industry for the years 1948-55.

Dr. R. S. Jane has been elected president of Shawinigan Chemicals Ltd., and Victor G. Bartram, who has retired as president, has been named chairman. Dr. Jane previously was executive vice-president. Mr. Bartram retired as president also of Canadian Resins and Chemicals Ltd., B. A.-Shawinigan Ltd. and St. Maurice Chemicals, Ltd., companies associated with Shawinigan. He remains a director of the three companies. R. J. Southwell was named president of Canadian Resins and Dr. Jane was named president of B. A.-Shawinigan and St. Maurice Chemicals.

James G. Smith, vice-president and managing director of Tillotson Rubber Co., St. Johns, Quebec, has been elected president of the Canadian Playthings Manufacturers, Inc. As senior spokesman for CPM, he will represent 135 members in an industry which looks forward to increasing the $35,000,000 in business it did last year.

Flaked Nitrates Available

J. T. Baker Chemical Co., Phillipsburg, N. J., has announced the availability of calcium nitrate, tech., and zinc nitrates, tech., in thin flat flakes. The company maintains that not only are these materials easier to handle in flaked form, but there are substantial savings in time and money. Uniform purity, controlled pH and freedom from extraneous matter are said to insure better quality in finished goods with fewer rejects. The company states that latex processors gain better control of coagulation because of the controlled high assay and known water of hydration. Because of the low melting points and deliquescent nature of these chemicals, they are packaged with polythylene liners and stored in an air conditioned warehouse at a temperature below 85°F.

Velgos Joins Research Staff

Robert Velgos has joined the research staff of Michigan Chemical Corp., Saint Louis, Mich., according to an announcement by Dr. Dwight Williams, director of research. Mr. Velgos is a 1951 graduate of the University of Detroit with a bachelor of science degree in chemistry and has done graduate work at George Washington University. He recently served as a supervisory chemist at the U. S. Naval Powder Factory, Indian Head, Md. Mr. Velgos' activities will be directed mainly to the development of new organic chemical products.

SELECTED CANADIAN RUBBER STATISTICS—1948–55

(Long Tons)

Item	1948	1949	1950	1951	1952	1953	1954	1955
Synthetic rubber production—total	40,455	46,642	58,440	62,293	74,272	80,922	86,581	103,896
S-type	32,242	37,333	41,873	38,313	50,070	53,186	59,467	69,005
Butyl	7,952	7,047	12,921	14,754	16,899	16,801	16,116	21,314
Other	261	2,262	3,646	9,226	7,303	10,935	10,998	13,577
Synthetic rubber imports—total	1,004	1,196	1,603	1,652	2,463	[2]2,350	2,759	[2]7,250
New rubber consumption—total	62,121	56,362	68,695	70,809	67,099	73,394	71,656	84,517
Natural—total	41,567	38,299	46,118	44,376	33,501	37,480	41,576	44,321
Synthetic—total	20,554	18,063	22,577	26,433	33,598	35,914	30,080	40,196
S-type	16,900	14,915	17,683	20,111	27,112	28,681	23,489	33,679
Butyl	2,633	2,074	3,325	4,460	4,197	4,541	2,033	3,285
Neoprene	913	957	1,316	1,422	1,697	1,894	3,789	2,332
N-type	108	29	59	89	111	139	142	156
Other		88	194	351	481	659	627	744
End-of-period stocks								
Synthetic rubber—total	4,336	4,442	3,015	5,085	4,743	6,209	5,268	8,791
S-type	3,233	2,956	1,731	3,501	2,491	3,591	3,356	6,764
Butyl	894	848	651	809	1,547	1,610	811	1,065
Neoprene	161	164	169	267	204	243	252	385
Other	48	474	464	508	501	765	849	577
Synthetic rubber exports—total	20,459	29,773	[2]38,900	[2]35,400	[2]43,500	[2]45,900	[2]60,200	[2]67,400

[1]Partially estimated by the Rubber Branch, Chemical and Rubber Division, BDSA; [2]Calculated by the Rubber Branch. Source: Dominion Bureau of Statistics and Secretariat of the International Rubber Study Group.

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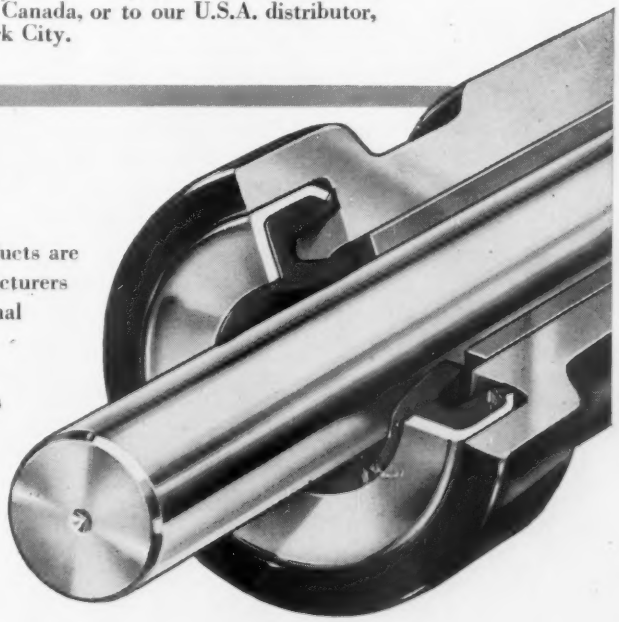

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Obituaries

Henry A. Golwynne

Henry A. Golwynne, president of three chemical concerns, died on April 3 of a heart ailment while vacationing in West Palm Beach, Fla. He was 66 years old. Mr. Golwynne was president of the Golwynne Chemicals Corp., New York, N. Y., the Rufert Chemical Co., Centerbrook, Conn., and the Mullite Refractories Co., Shelton, Conn. Born in London, he attended private schools there and in South Africa. Mr. Golwynne came to the United States in 1919 after serving in World War I as a major in the British Army and receiving the Military Cross for bravery. Soon afterward he founded the Golwynne Magnesite and Magnesia Corp. In 1931 the concern's name was changed to the Golwynne Chemicals Corp. In 1925 he purchased a sillimanite mine in India valued at $1,500,000. It was reputed to contain the only natural deposit of the ore, an aluminum silicate also known as fibrolite, large enough to be of use commercially. For several years, Mr. Golwynne was president of the Centerbrook Manufacturing Co. which he merged with the Rufert Chemical Co. after he acquired that enterprise in 1953. He had been president of Mullite Refractories since 1951. A bachelor, he is survived by a brother and sister.

Edward Lyman Bill

Edward Lyman Bill, president of Bill Brothers Publishing Corp., New York, N. Y., publishers of *Rubber World, Plastics Technology* and other business papers, died on April 22 in Capetown, South Africa. His age was 58. He had been in Capetown on business. Mr. Bill studied at the University of Wisconsin and Columbia University. He was a founder and a director of Business Publications Audit of Circulation, Inc., and a former director of National Business Publications, Inc. Mr. Bill belonged to the Lotos, Canadian, National Republican and Engineers Clubs and was a member of the Sons of the American Revolution and the Army Ordnance Association. He leaves a daughter, a brother and two sisters.

Ludwell H. Gilmer

Ludwell Harrison Gilmer, founder of the L. H. Gilmer Co., Philadelphia, Penna., now a subsidiary of the U.S. Rubber Co., New York, N. Y., died on March 28 of a heart attack at his home in Princeton, N. J. He was 80 years old. Mr. Gilmer, a pioneer in the development of endless and V-belts for automobiles and industrial use, founded his company in 1906, and he remained as its president until 1931, when he retired. An endless fan belt Mr. Gilmer produced was used as original equipment in the Model T Ford and other automobiles of the period. Survivors include his widow, two sons, a daughter.

Frederick H. Leonhardt

Frederick H. Leonhardt, chairman of the board of Fritzsche Brothers, Inc., New York, N. Y., and its affiliate, Dodge & Olcott, Inc., died on April 10 at his home in Douglaston, N. Y. His age was 83. An expert in the American essential oil industry, Mr. Leonhardt was associated with his firm for more than 60 years. Born near Leipzig, Germany, he served an apprenticeship in chemistry with a local drug house and later a leading chemical manufacturer. Mr. Leonhardt came to the United States to join the New York branch of Fritzsche, Schimmel & Co. Years later, as vice-president and then president of Fritzsche Brothers, Inc., he initiated surveys by which the industry gained scientific data it needed to properly evaluate essential oils being imported. Mr. Leonhardt was a trustee of the Community Church of Douglaston, a member of a Masonic Order, the Chemists' Club, and past-president of the Drug & Chemical Club. He is survived by his widow, a daughter and son.

John S. Clement

John S. Clement, president and founder of the Sandura Co., Inc., died on April 22 in the Germantown Hospital, Philadelphia, Penna., after suffering a cerebral hemorrhage two days earlier. He was 73 years old. Mr. Clement graduated from Swarthmore College in 1908. He founded Sandura, a sales subsidiary of the Paulsboro Manufacturing Co., makers of hard-surface floor coverings and other products, in 1923 and had been its president since then. He was also a director of Paulsboro and the George E. Mallinson Importing Co. From 1934 to 1936, Mr. Clement was a member of the Industrial Appeals Board of the National Recovery Administration. He was chief of the Industrial Manufacturers and Materials Division of the Office of Price Administration from 1944-1946. Surviving are his wife, a son and two daughters.

John G. Milligan

John G. Milligan, founder and president of J. G. Milligan & Co., Milwaukee, Wisc., died April 8 at his home at Miami Beach, Fla. He was 63. Mr. Milligan founded his company in 1916 and had been president since then. The firm, which has a plant in Milwaukee and in Chattanooga, Tenn., manufactures adhesives and coatings for the automobile, shoe, textile and paper trades. Mr. Milligan was a member of Braden Masonic Lodge, St. Paul. He also belonged to the Wisconsin Consistory, Tripoli Shrine, the Athletic Club, Blue Mound Golf and Country Club, the La George Golf and Country Club of Miami Beach, and the Leather and Allied Trades Association. Survivors are his wife, a son and a daughter.

Eugene C. Crittenden

Dr. Eugene Casson Crittenden, retired associate director of the National Bureau of Standards, died on March 28. He was 75 years old. Dr. Crittenden retired from the Bureau of Standards in 1950 after 41 years' service. However, he continued to act as consultant to the director. An expert on standards of physical measurement, Dr. Crittenden served as United States representative on the International Committee on Weights and Measures from 1946 to 1954. He was instrumental in setting up the system of electrical units that provides the basis for electrical measurement throughout the world. Dr. Crittenden received the Commerce Department's gold medal for exceptional service in 1949. In 1946 he received the gold medal of the Illuminating Engineering Society for meritorious achievement.

George L. McCrea

George Locke McCrea, manager of the Mechanical Goods Department, Goodyear Tire & Rubber Co. Ltd., New Toronto, Ont., died on March 25 after a long illness. A pioneer in the Canadian rubber industry, Mr. McCrea retired in 1947, after being with Goodyear for 39 years. Born in Toronto, he attended schools in that city. He was a senior elder of Humbercrest United Church and a 32nd degree Mason affiliated with Kingsway Lodge. Mr. McCrea was a member of the Lodge of Perfection, the Moore Consistory, Rose Croix, past president of the Baby Point Club, and charter member and past-president of the Dickens Fellowship in Toronto. He is survived by his widow, a son and daughter.

Walter Emery

Walter Emery, retired director of advertising and economist of the U.S. Rubber Co., New York, N. Y., died of a heart attack on March 27 at Garfield Memorial Hospital, Washington, D. C. He was 76 years old. Mr. Emery was graduated from the University of Tennessee in 1903 and later received a law degree at the University of Virginia. He was a charter member of the Panama Canal Society. From 1924 to 1946, Mr. Emery was a resident of New York, where he served as secretary of the New York Society of Colonial Wars. He was a member of the St. Nicholas Society and the Sons of the Revolution. He is survived by his widow.

James M. Talbot

James M. Talbot, executive vice-president of the S.S. White Dental Manufacturing Co. of Princes Bay, Staten Island, N. Y., died on April 23 at his home at Dongan Hills, Staten Island, N. Y. He was 73 years old. Mr. Talbot attended Wesleyan University and the Massachusetts Institute of Technology. He joined S. S. White forty-seven years ago. Mr. Talbot was a past-executive officer of the American Society of Mechanical Engineers and a vice-president of the Richmond Savings Bank. He is survived by his wife and two sons.

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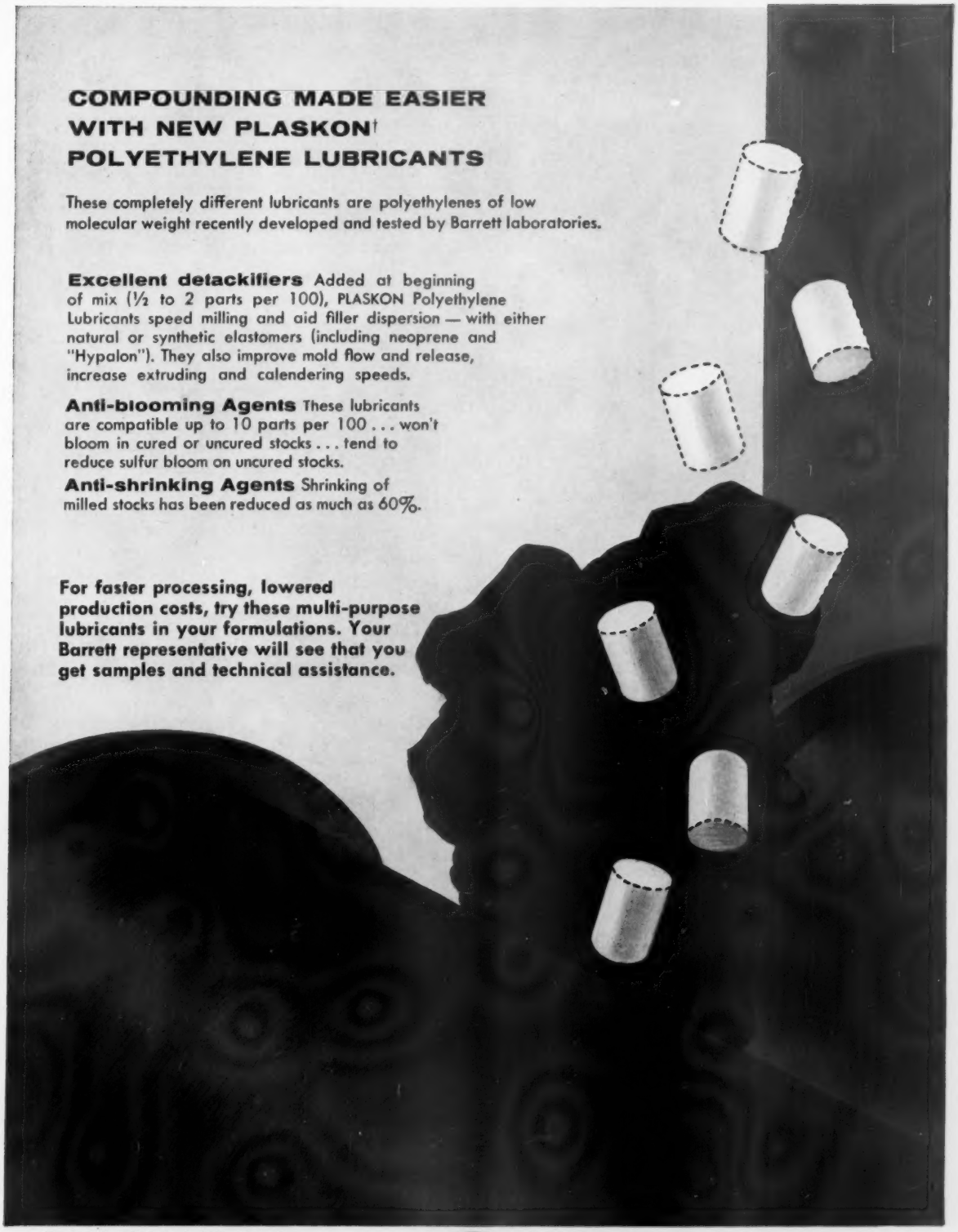
Excellent detackifiers Added at beginning of mix (½ to 2 parts per 100), PLASKON Polyethylene Lubricants speed milling and aid filler dispersion — with either natural or synthetic elastomers (including neoprene and "Hypalon"). They also improve mold flow and release, increase extruding and calendering speeds.

Anti-blooming Agents These lubricants are compatible up to 10 parts per 100 . . . won't bloom in cured or uncured stocks . . . tend to reduce sulfur bloom on uncured stocks.

Anti-shrinking Agents Shrinking of milled stocks has been reduced as much as 60%.

For faster processing, lowered production costs, try these multi-purpose lubricants in your formulations. Your Barrett representative will see that you get samples and technical assistance.



† Trade Mark of Allied Chemical & Dye Corporation

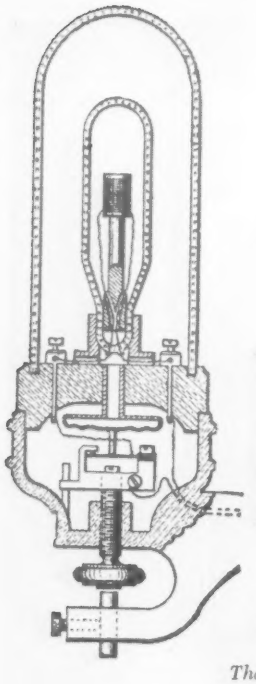
Barrett

BARRETT CHEMICALS

BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, P. Q.

OVER 100 YEARS OF EXPERIENCE

Allied Chemical



Important dates in the History of Industrial Progress

1879

In electricity . . .

Thomas A. Edison, possibly America's greatest inventor, closed a switch and opened an era. The incandescent lamp remains one of the most significant discoveries of all time.

In the history of fats and waxes

Koettstorfer described the saponification value of fats and oils. In conjunction with acid (neutralization) value, saponification value is a guide to the amount of esters present in a fatty acid.

GROCO fatty acids are wholly free of undesirable esters because no solvents are used in their production. Exceptional uniformity, color and stability are other qualities industry has learned to associate with the A. Gross trademark.

Send for samples and the catalog "Fatty Acids In Modern Industry".

GROCO 56
HYDROGENATED STEARIC ACID

Titre	55°C min.
Titre	131°F min.
Color 1" Lovibond Red	8 max.
Color 1" Lovibond Yellow	50 max.
Saponification Value	198 min.
Acid Value	190 min.
Iodine Value	13 max.

A. GROSS & COMPANY

295 Madison Avenue, New York 17, N. Y.

Factory: Newark, N. J. Distributors in Principal Cities

Manufacturers Since 1837

New Goods

Bilnor Happy Harbor Pools

A new, above ground, circular swimming pool that is 25 feet in diameter, has been introduced by the Bilnor Corp., 300 Morgan Ave., Brooklyn 11, N. Y. The pool holds about 12,000 gallons of water and can accommodate more than 12 people without crowding. With a liner of durable Krene and 42-inch sidewalls supported by a plastic coated wire fence, two people can set up the pool in a few hours or less. "Happy Harbor Giant" is equivalent in area to a pool 35 by 14 feet. The heavy-gauge pool liner made of Krene is said to withstand the weight of the water it holds without tearing and can be repeatedly folded without cracking or peeling. The galvanized wire fence is protected with a coating based on Bakelite vinyl resins.

The two basic parts of the swimming pool, flexible pool liner and wire fence, come neatly packaged in trunk-size cartons that make end-of-summer storing easy. The pool is simply assembled on a large level site by rolling out the wire fence to form a complete circle and then fitting the durable liner inside it. The next step is to fill the liner with water. An inflatable bumper also made of Krene runs around the top of the sidewall to protect active swimmers getting in and out of the pool. Similar Happy Harbor pools with diameters of 8½, 12, 16 and 20 feet are also available. The durable pool liner is resistant to abrasion, sunlight, tearing, grease, oils and chemicals such as those used for water purification, or soaps and detergents used for periodic cleaning. Even if stored away when wet, the lining does not rot and is not affected by mould or mildew.

Quaker Synthetic Rubber Hose

A new lightweight hose constructed entirely of synthetic materials has been developed by Quaker Rubber Corp., Tacony and Comly Sts., Philadelphia 24, Penna. It is said to be the first of its type that can be used effectively at elevated temperatures in keeping jet engines heated and ready for immediate use. It is capable of handling air continuously at temperatures up to 400°F. and working pressures of 100 pounds per square inch. The hose can be made with inside diameters of from ¾ to 5 inches, in lengths up to 50 feet. Although complete details of construction and materials have not been disclosed, the hose is said to be exceptionally strong, lightweight and flexible. These characteristics suggest many other applications for it in the industrial field.

Increased Wear at Channel Black Prices

Vulcan® 3 HAF

HIGH ABRASION FURNACE CARBON BLACK

Used by the world's leading rubber manufacturers of tires, mechanical goods, extruded or molded goods and other rubber products where high reinforcement and abrasion resistance are essential.

CABOT®

Godfrey L. Cabot, Inc.

77 FRANKLIN ST., BOSTON 10, MASS.

MAPICO®

Now offers 7 superior COLORS for RUBBER

REDS 297 • 347
387 • 477 • 567
TANS 15 and 20

• COLUMBIAN COLLOIDS •

All are high color iron oxide pigments of exceptional purity.

All are characterized by unusual brightness in mass tone and clarity in tints.

The reds in the order shown range from strong color on the light side to deeper red with bluer cast.

TESTS WITH NATURAL AND SYNTHETIC RUBBER HAVE SHOWN EXCELLENT AGING CHARACTERISTICS

Check these desirable points:
- Clean bright color and tint
- Easy dispersion and processing
- Color permanence
- Exceptional strength
- Unusual purity
- Fine particle size
- Good aging behavior
- Moderate reinforcement
- Tear and flex resistance
- Low "deleterious-copper" content
- Low "deleterious-manganese" content
- Controlled pH

For better color and better products use these MAPICOS in:
- High quality inner tubes
- Footwear—soles, heels, uppers
- Rubber hose
- Rubber mats
- Drug items
- Sundries
- Chemical goods
- Cellular rubber

Our technical staff is at your service — let us assist you.

COLUMBIAN CARBON COMPANY
MAPICO COLOR DIVISION
380 MADISON AVENUE, NEW YORK 17, N. Y.

Hungerford Mouseketeer Doll

A new Walt Disney Character doll has been introduced by Hungerford Plastics Corp., Rockaway, N. J. The "Walt Disney's Official Mouseketeer Doll" is a characterization of a Mouseketeer as seen on the Mickey Mouse Club program on ABC-TV. Miss Mouseketeer, 12 inches tall, is molded of soft lifelike vinyl plastic with emphasis on detail. She has a removable cotton

skirt, and her panties, shoes, socks, sweater and hat are molded and spray painted. The skirt is made in a variety of colors, and her hat is identical to that worn by real Mouseketeers and has a little painted bow centered between two black mouse ears. Her sweater has the Mickey Mouse club insignia in relief, with the face of Mickey Mouse in black on a white background. She has jointed arms and legs, and her head can be turned from one side to the other; she can be made to sit or stand in a variety of positions.

Fire Curtain Hot Material Belt

The development of a new hot material conveyor belt made with glass fabric insulation has been announced by the B. F. Goodrich Industrial Products, Akron, Ohio. The new "Fire Curtain" belts have two plies of glass fabric that float in the top rubber cover. Experiments indicate that the glass fabric retains its strength despite contact with scorching chunks of hot metal, heated to temperatures as high as 1400° F., thus barring the progress of fiery metal objects through the belt. When a hot piece of metal drops on the belt, the belt's rubber cover chars at that spot, but only as far down as the glass fabric heat barrier. Hot metal cannot penetrate the barrier, and the over-all strength of the belt and its cover remains as strong as ever. In conventional belts, hot metal objects burn holes clear through belts in one continuous burning action. The new belt was developed primarily for use in foundries where burnt holes are the major cause of belt failure; however, the construction is available for hot material conveyor belt applications in other industries.

want to soften up a tough opponent?

Plasticize GR-S with PARA FLUX®

Standard of the Rubber Industry for 30 years

AKRON, OHIO LOS ANGELES, CALIF.
CHICAGO, ILL. NEWARK, N. J.

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

Here's your

You be the Judge!

It's up to you to decide whether *your* rubber products will be found guilty of chemical B.O. acquired during processing. It is now possible for you to treat your batches with ALAMASK® odor-masking compounds that impart clean, neutral odors to your finished products. From the table below you can select the particular ALAMASK for your application —

"ALAMASK" TYPE RECOMMENDED	Latex					Dry Rubber				Elasto-Plastics		
	Foam	Sponge	Dipped Goods	Bonded Fibers	Adhesives	Natural	Synthetic	Reclaim	Chemically Blown	Polyvinyl	Polyaryl	Plastisols
AA										X	X	X
AF					X		X		X			
AO or AO-X					X	X	X		X			
AR or AR-F			X		X							
BF or BG-X	X	X	X		X	X	X					
BGM or BGM-X	X	X		X		X						
CY					X				X			
DJ	X	X	X				X		X			
DL							X		X			
H			X		X			X	X	X	X	
LD	X	X	X	X	X	X		X				
ND or ND-X	X	X	X	X	X	X	X	X	X	X	X	
O	X	X	X	X		X	X		X	X	X	X
OS or OS-X	X	X	X	X			X					

For use in latex, the water-dispersible "ALAMASK" form is recommended. The water-dispersible forms are designated by "-X" or "-F" following the "ALAMASK" type name.

ALAMASK has no effect on processing characteristics or rate of cure . . . the only noticeable effect you will detect will be the upward trend of your sales curve!

NOTE

ALAMASK also abates malodors from stack fumes and plant effluents.

Rhodia INC. For technical data and assistance, write RHODIA, INC., 60 E. 56th ST., NEW YORK 22, N. Y.

IN CANADA: NAUGATUCK CHEMICALS,
DIVISION OF DOMINION RUBBER CO., LTD.
MONTREAL • TORONTO • ELMIRA • WINNIPEG

Molded Vinyl Beach Sandals

The production of a new long-wearing children's sandal molded of Bakelite vinyl resins has been announced by the Monrovia Plastic Co., Inc., 904 S. Alta Vista Ave., Monrovia, Calif. According to the manufacturer, these sandals, called "Rovies", are softer on children's feet and outwear conventional sandals many times over. If worn while wading, or held under a faucet

to flush off sand and dirt, Rovies will dry clean and fresh without shrinking, cracking or fading. After a quick cleaning, the new sandals can be placed in a beach bag without soiling the other contents. The bright, molded-in colors do not wash away. The flexibility of the sole allows children's feet complete freedom and provides a comfortable fit. Rovies sandals are available in children's regular shoe sizes.

Campco Woodgrain Finish Sheet

A highly realistic woodgrain finish capable of being formed into complex three-dimensional parts at low cost has been made available for the first time in a thermoplastic sheet, according to the manufacturers, Campco Division, Chicago Molded Products Corp., 2717 N. Normandy Ave., Chicago 35, Ill. The new woodgrain finish, added to Campco, a rubber-modified styrene sheet, is a permanent and integral part. Available in blond mahogany, dark mahogany and driftwood finishes, it is seen to have many applications in the toy and display field. Each of the three types of woodgrain finish is realistic and requires no protective coatings. In addition, a wide variety of effects may be obtained by silk screening, spraying or applying decals to the finish.

When transparent colors are applied to the new sheet, the grain shows through. The new woodgrain Campo is said to have the same qualities as the standard Campco sheet, including high impact resistance, dimensional stability, moisture resistance, and excellent formability. In comparison to the high cost of producing a display made of actual wood, for example, the low cost, wood finish sheet can be vacuum-formed over inexpensive molds in a matter of seconds. The result is a stronger, lighter and more satisfactory display, the company states.

SUN OIL COMPANY GIVES

DEPENDABLE QUALITY, CONTROLLED COMPOSITION

TO THE RUBBER INDUSTRY

in

CIRCOSOL-2XH
SUNDEX-53
CIRCO LIGHT RUBBER PROCESS AID

Sun's Rubber Process Aids are known the world over for their valuable assistance to the rubber compounder.

These products are available both nationally and internationally at moderate prices.

To learn more about using Sun Rubber Process Aids to get better physicals, lower costs, and easier processing, see your Sun representative. Or write for free literature to SUN OIL COMPANY, Phila. 3, Pa., Dept. RA5.

SUNOCO®

FREE TECHNICAL BULLETINS

An Ozonator for Accelerated Testing of Rubber (Bulletin 36); A Method for Classifying Oils Used in Oil-Extended Rubbers; Circosol-2XH, Sundex-53 (Bulletin 14); Processing Natural Rubber and Synthetic Polymers; Sundex-41; Sundex-53 (Bulletin 18); Sunoco Anti-Chek (Bulletin 30).

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

Kentucky Color
AND CHEMICAL COMPANY, INC.
Louisville 12, Kentucky

RUBBER COLORS

DRY COLORS

CITATION REDS
DURAVYN REDS
PHTHALOCYANINE BLUE, GREEN
CADMIUM YELLOWS
CADMIUM REDS
CHROME YELLOWS
PYRAZOLONE REDS
MOLYBDATE ORANGE

Water Dispersed
RUBBER LATEX COLORS

PHTHALOCYANINE BLUE
PHTHALOCYANINE GREEN
PIGMENT GREEN B
CHROMIUM OXIDE
YELLOW IRON OXIDE
RED IRON OXIDE
ORGANIC REDS

To: Kentucky Color & Chemical Co.
Louisville 12, Kentucky
Gentlemen:
Send me detailed information on Rubber Colors_____
Have representative call_____
NAME_____
TITLE_____
COMPANY_____
ADDRESS_____
MY FIRM MAKES_____

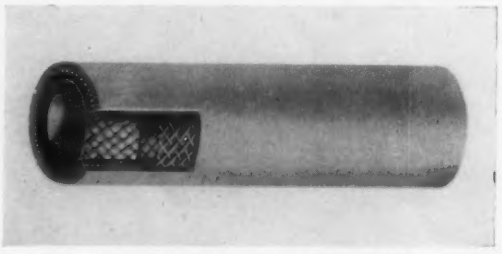
Solvaseal Work Gloves

Surety Rubber Co.,, Carrollton, Ohio, has developed a new coating compound which is claimed to be practically indestructible in the presence of such high powered solvents as ketones, acetones and petroleum base degreasing solvents. The new compound has been tradenamed "Solvaseal" and is now being applied to fabric work gloves which are sold under that name. The gloves

themselves are of Surety's special design incorporating curved fingers for hand comfort and wing-thumb construction which eliminates pulling loose at the seam between the thumb and palm. "Solvaseal Coated Fabric Work Gloves" are manufactured in women's 11-inch gauntlet style and men's 12 and 14-inch gauntlet style. The coating is an attractive cherry red to differentiate them from other Surety coated gloves.

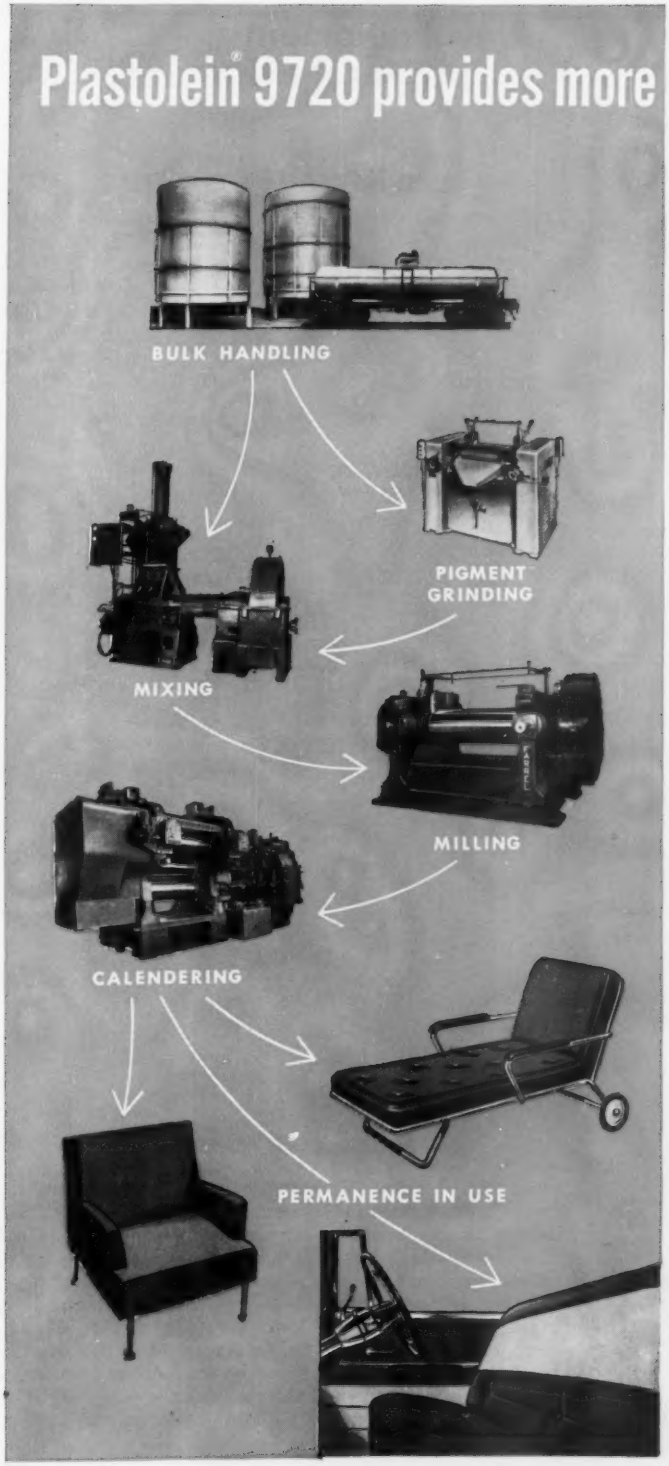
Hamilton Wash Up Hose

A new wire braid hose with a specially compounded white neoprene grease and fatty oil-resistant cover has been added to the line of hoses produced by the Hamilton Rubber Manufacturing Co., Prince & Meade Sts., Trenton, N. J. Known as "Revelation Wash Up Hose," this new product was developed for maximum flexibility under the high pressure hot water and steam conditions and the extra severe service requirements found in fish



canneries, meat-packing houses, dairies and food-processing plants of all kinds. The inner tube is made of a heat-resisting compound for extra long life under hot water and steam service. A high tensile steel wire braid reinforced carcass prevents the hose from bursting or rupturing. The sanitary white neoprene heat and abrasion-resistant cover is inseparably bonded to the wire carcass by a ply of high tensile heat-resisting cord yarn. Revelation Wash Up Hose is available in inside diameter sizes of ½, ¾ and 1-inch, and it will handle saturated steam to 150 pounds per square inch.

Plastolein® 9720 provides more measurable advantages



IN PROCESSING...
IN PERMANENCE

Here's how Plastolein 9720 Polymeric can help you make a better vinyl with more sales appeal —at lower cost!

PROCESSING: The outstanding processing ability of 9720 makes possible savings all along the line.

Bulk Handling: A low viscosity fluid, 9720 can be shipped in tankcars, stored in bulk, and piped to point of use at substantial savings over drum units.

Pigment Grinding: An excellent grinding vehicle, Plastolein 9720 produces uniform dispersions possessing unusually low-viscosity for easier handling.

Mixing & Milling: The excellent wetting ability of 9720 results in more uniform dispersions of pigments and resins, reducing waste and rejects.

Calendering: Stocks containing 9720 process easier, faster and require minimum attention. Air entrapment and coldstreaks are minimized.

PERMANENCE: Useful life of finished sheeting, film and coated fabrics is increased 3 to 4 times over monomeric formulations.

Write today to Dept. US for complete information or evaluation samples of Plastolein 9720 Polymeric.

Emery

Fatty Acids & Derivatives
Plastolein Plasticizers
Twitchell Oils, Emulsifiers

Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio

New York • Philadelphia • Lowell, Mass. • Chicago
Cleveland • San Francisco

Warehouse stocks also in St. Louis, Buffalo, Baltimore and Los Angeles

Export: Carew Tower, Cincinnati 2, Ohio

FOR HIGH SPEED

Extrusion Compounds

BURGESS "ICEBERG" and BURGESS "PIGMENT NO. 20"

Aluminum Silicate Pigments specifically designed for use in natural rubber and GR-S high speed wire compounds:

BURGESS ICEBERG* An anhydrous aluminum silicate pigment for use as a filler in natural or synthetic rubber compounds. It is an exceptionally good white filler and provides outstanding processing and electrical properties. "Iceberg" prevents stickiness on *the mill and eliminates dieplating* of extrusion compounds, and also offers excellent resistance to alkalis and acids, provides high specific resistance and low moisture absorption properties.

BURGESS PIGMENT NO. 20—a hydrous aluminum silicate pigment in both natural and synthetic rubber compounds which provides level cures because of controlled pH. This Burgess water-washed kaolin type pigment is uniform in particle size, has excellent color and maximum freedom from impurities. It reduces tendency towards scorching and the forming of agglomerates and permits smoother extrusions at higher speeds.

Write for technical data, working samples and prices on these two Burgess products.

Typical Wire Insulation Formulation

GR-S	100
Process Oil	5
Millex	40
Sun Check Wax	4
Stearic Acid	1
Age Rite Resin D	1
Age Rite White	0.5
Zinc Oxide	15
Whiting (Water Ground)	50
Burgess Iceberg Pigment	15
Burgess Pigment #20	60
Sulfur	2
Litharge	5
M.B.T.S.	1
Zimate	1
	300.5

*For those desiring an even finer product—we recommend BURGESS "ICECAP K" in place of ICEBERG. "Icecap K" will give superior results.

Burgess Pigment COMPANY

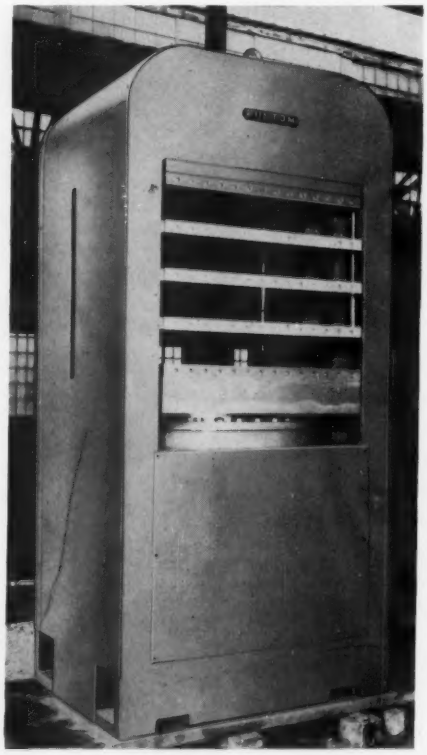
Mines and Plants: Sandersville, Georgia

- HYDROUS AND ANHYDROUS ALUMINUM SILICATE PIGMENTS
- KAOLIN CLAYS

New Equipment

Custom Multiframe Hydraulic Press

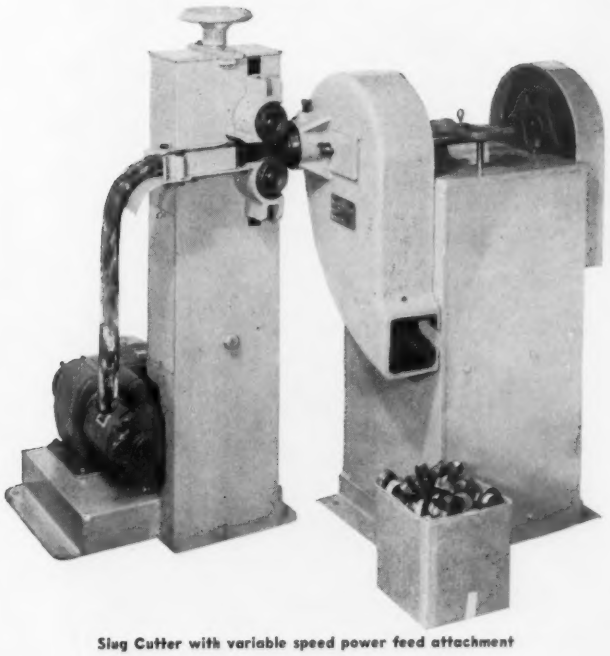
A new hydraulic platen press suitable for such molding operations as rubber, plastics, and plywood, has been announced by the Akron Rubber Machinery Co., P.O. Box 88, Akron 9, Ohio, sales agents for Custom Machine & Design, Inc., also of Akron. According to the company, the main frame members, called "multiframes," are cut from solid steel plates having no welds, threads, bolts or joints to loosen under load. The rams



are made of rolled steel and have reinforcing ribs to carry the load from the hydraulic pressure directly to the bottom of the bolster. The rampots are also made of rolled steel and are said to eliminate such disadvantages of castings as porosity, weaknesses and blowholes. Guiding of the bolster is accomplished by removable bronze liners which are located in the corners of the press and are adjustable by set screws. The ram is also guided by a bronze liner in the rampot and chevron type packing is furnished. All parts of the press are said to be easily removable without removing the press frame.

Designed to simplify the work of applying a preservative to molds, dies, instruments, and machinery, a rust preventive spray, packaged in a twelve-ounce aerosol spray container and known as **Rust Chek,** has been introduced by the Eastern Aerosol Products Co., Newfoundland, N. J. One can provides approximately 80 square feet of coverage in the form of a clear, dry, waxy film to a thickness of .0005-inch.

Machinery for the Rubber Industry



Slug Cutter with variable speed power feed attachment

RUBBER SLUG CUTTER

Report on Weight Tolerance from a User of the GOODMAN Rubber Slug Cutter . . .

> ***"With a skilled operator and good extrusions, this machine will consistently hold plus or minus one gram on uncured rubber slugs one inch in diameter by one inch long."***

This precision, plus high capacity, spells out production economies rarely found in rubber slug cutters.

Write for specification data sheet.

◆

VIBRATORY FEED INSPECTION TABLE

Improved Quality Control

Write for specification data sheet

G. F. GOODMAN & SON

401 RICHMOND STREET
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SALES REPRESENTATIVE:
RALPH B. SYMONS ASSOCIATES, INC.
3571 Main Road, Tiverton, Rhode Island

Make **BIG**

SAVINGS

Have Your Rubber Molds Processed With . . . KORBET IMPROVES RELEASE **TREATMENT**

U.S. PAT. PEND.

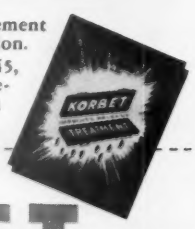
1. Improves Mold Release
2. Reduces Mold Cleaning
3. Increases Production
4. Minimizes Rejects
5. Eliminates Costly Mold Downtime

Write us about your steel mold production problems

TYPICAL KORBET TREATED MOLDS

A Korbet Treatment by absorbing lubricant in cavity surfaces will show you a tremendous improvement in mold release and decrease in rejection.

FREE! Write for Bulletin T-45, which completely describes the advantages obtained from a Korbet mold release Treatment.



KORBET CORPORATION

877 Addison Road • Cleveland 3, Ohio

Telephone: EXpress 1-4872 or EXpress 1-4548

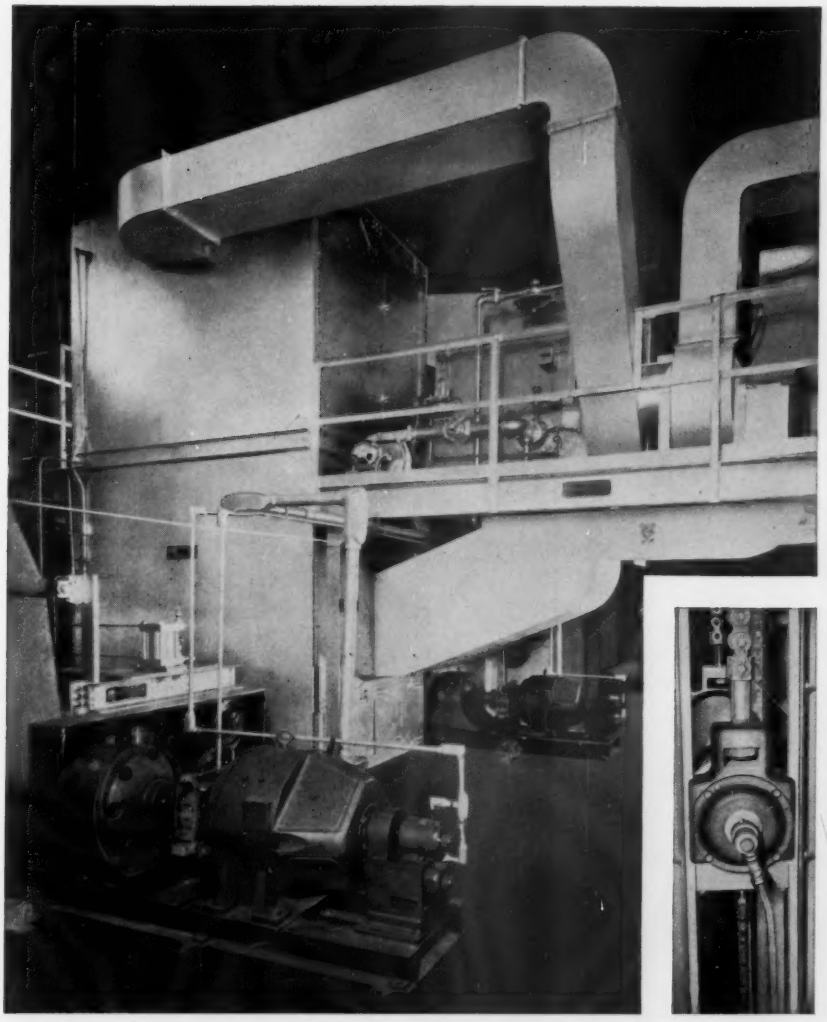
P.H.I. Open Side Press

To better serve the equipment needs of the plastic and rubber industry, Pasadena Hydraulics, Inc., at 273 N. Hill Ave., Pasadena, Calif., is now offering a group of "C" frame presses as an addition to their standard line of straight side presses. Like all other units of the P.H.I. line, these presses are rugged, compact, and of

neat appearance. Rigid construction and precision ground platens with cast-in cooling coils and calrod heaters individually controlled by thermoswitches to 600°F., assures efficient and even temperatures. P.H.I. patented fast action two-stage hydraulic pump provides quick closing and produces maximum pressure with ease.

Peschel Corona Test Set

A self-contained and non-destructive unit that enables simple and accurate corona testing for research, development or production requirements has been announced by Peschel Electronics Inc., 15 Garden Street, New Rochelle, N. Y. The new corona test set is said to include all the necessary circuit refinements and controls to permit a continuous and adjustable output. An overload relay protects the specimen and the power unit in the event of a short circuit. Voltage indication is provided for with a triple range kilovoltmeter at the output terminals. Special sweep circuits provide a straight line oscilloscope trace with recurring corona pulses occupying the center of the trace. It is said that the presence of noise will not detract from the clear presentation of these pulses. The set can be equipped with a motorized output control to enable the gradual application of test voltage at uniform rates of 500 or 1000 volts per second. According to the company, the set permits high sensitivity corona detection of all electrical equipment and material and meets ASTM, MIL, JAN and IPCEA specifications. Standard sets are available from small portable units to very large sets of up to 100 kva capacity and in voltages up to 30 kv.



Within the first day of startup, full width nylon tire cord processed in this 30-yard-per-minute, 14,000-pound-tension **IOI** Rollevator® Oven*, was made into aircraft tires meeting all qualification tests.

The Rollevator® roll automatically moves up and down within the oven, in direct relation to line speeds. Thus, at *any line speed, heat-exposure* time of the nylon is held *constant* at a constant temperature setting and at constant tension.

Rollevator® Oven* hot stretches nylon tire cord at constant optimum temperature, constant time and constant tension, at variable line speeds

The IOI Rollevator® Oven* is the answer to more uniform hot stretching of nylon with greater production efficiency. Simple and automatic in operation, it practically eliminates costly shutdown and repair time. When the line is stopped the Rollevator® roll automatically lowers out of the heat zone, eliminating the need for quick cool purging of the oven and the time and expense involved in reheating the oven when starting up again. Its low operating cost combined with low initial cost assures you of lower production cost. An IOI sales engineer will be glad to give you complete information about the Rollevator® Oven* and to discuss your requirements for any system from 3 to 100 yards per minute.

®Trade Mark Registered
*Pat. Applied For

INDUSTRIAL IOI ENGINEERING VERSATILITY **OVENS, INC.**

13803 TRISKETT ROAD CLEVELAND 11, OHIO

Patapar®

RELEASING PARCHMENTS

peel off easily
from pressure sensitive
and tacky surfaces

Separator for rubber tape—just the right "release" action

Ideal backing for pressure sensitive surfaces

Effective separator sheet for uncured, natural or synthetic rubbers

Releases readily from pressure sensitive plastics

Correct "releasing" action in almost any situation is provided by new *low cost* Patapar Releasing Parchments. These special types of Patapar Vegetable Parchment excel as a backing material, liner, interleaver, overwrap, separator sheet and many other uses.

Features of Patapar Releasing Parchments include: *dense, fibre free texture; high resistance to penetration or migration of oil and softeners; permanent releasing action.*

Tell us your intended application and we will gladly send testing samples and technical data.

Write today

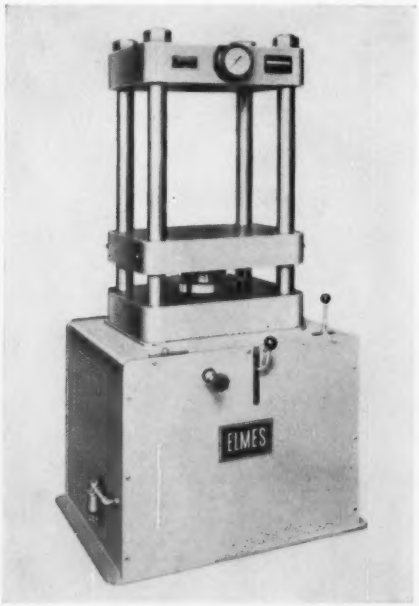
PATERSON PARCHMENT PAPER COMPANY
Bristol, Pennsylvania
Sales Offices: New York, Chicago
West Coast Plant: Sunnyvale, California

Patapar®
Vegetable Parchment
HI-WET-STRENGTH · GREASE-RESISTING

HEADQUARTERS FOR VEGETABLE PARCHMENT SINCE 1885

Elmes Hydrolair Press

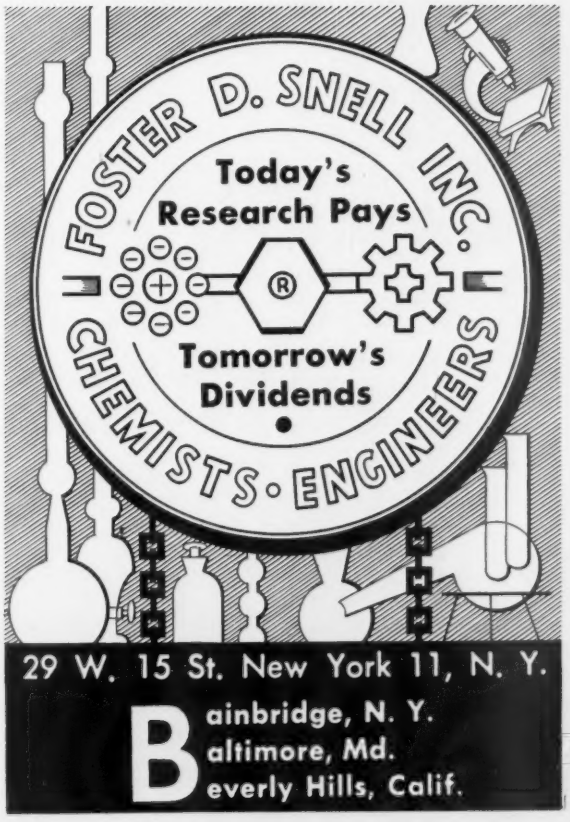
Elmes Engineering Division, American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio, has announced the availability of a small, low-cost production press in 75 and 100 ton sizes in addition to the previously available 30 and 50 ton sizes. All sizes are available with either hand lever or optional electric pushbutton control. Called the "Hydrolair", the



unit has neither motors nor pumps, its special hydraulic intensifier, the "Power-Petuator", being powered solely by compressed air, regular "shop air" in most installations. The special intensifier, according to the company, provides a continuous high-pressure stroke and maintains any preset pressure for as long as desired, without any attention from the operator. The press finds use in rubber molding, compacting, laminating, assembly, forming, gluing, and laboratory test work.

Small Oakes Continuous Mixer

The E. T. Oakes Corp., Commack Road, Islip, L. I., N. Y., has announced the development of a new and smaller model of its continuous automatic mixer. Known as Model 8M, the new unit has been designed to fit the production requirements of the smaller plant, with results equal to those obtained with the larger models, it is claimed. The company states that the new model has a capacity of 50 to 450 pounds of latex foam rubber per hour. The unit is provided with the same equipment as the larger models, including proportioning pumps for zinc and gel. The company indicates that this new model has been made available because of the large demand from the field for a mixer of lesser capacity and lower cost, to permit smaller plants to obtain the same quality and production benefits as the larger plants, with proportionate savings. The unit is also adapted to research, experimental and pilot plant work on a wide variety of materials. It is available on lease or for outright purchase.



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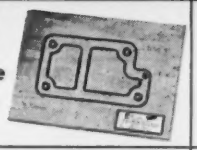
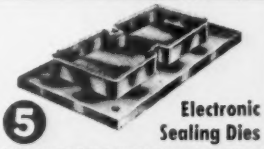
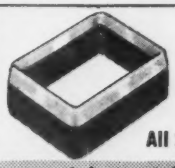


2 Steel Rule Clicker Dies



5 Electronic Sealing Dies



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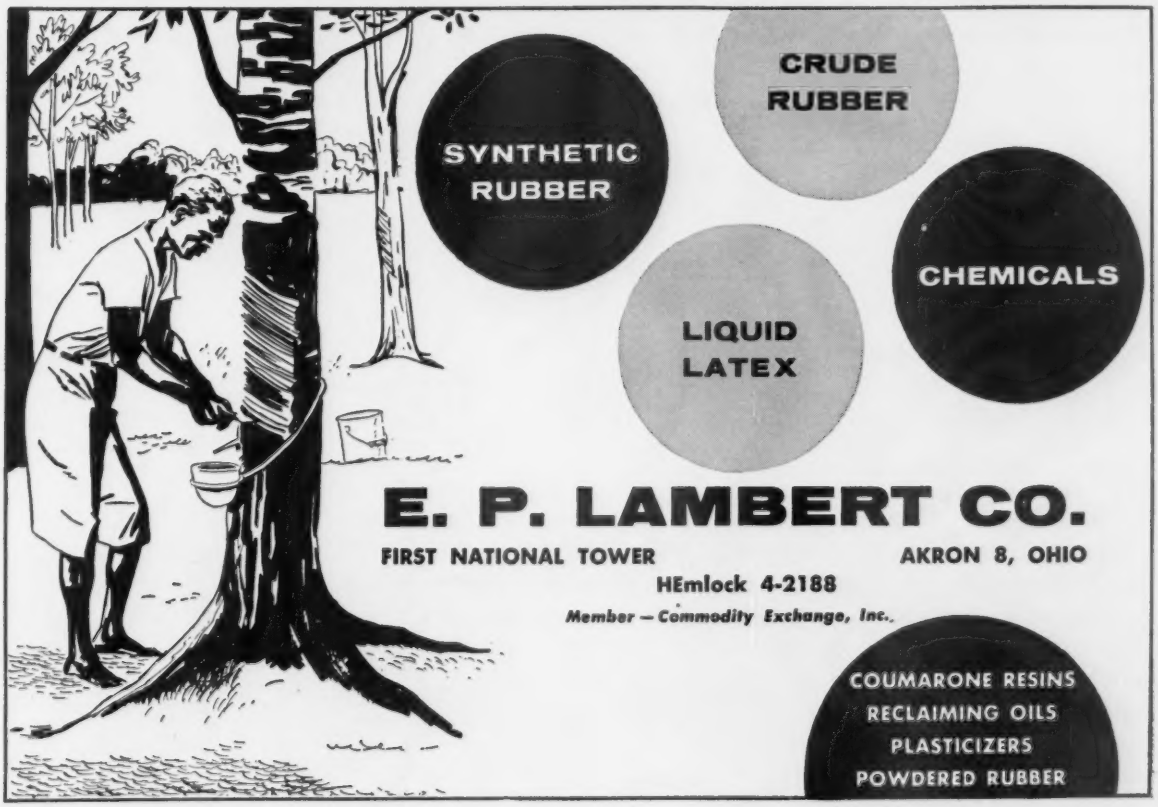

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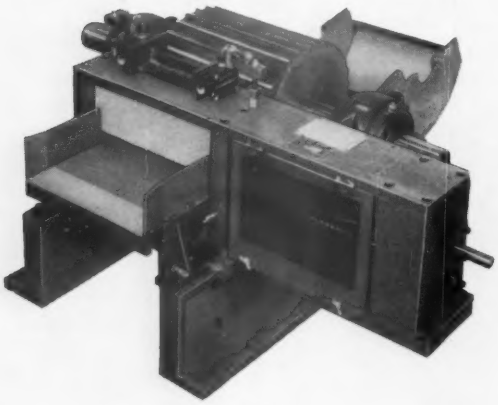

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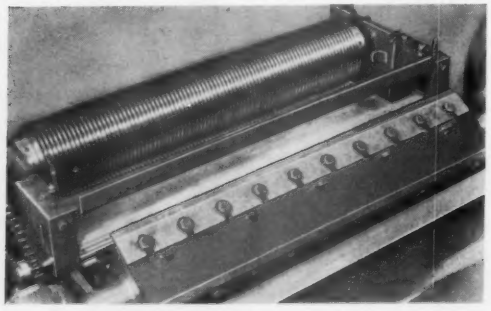
We illustrate two typical examples. The 710 Pelleter was made expressly for extruded rods. Compare it with our type 245 which was designed to take a 42" wide sheet, to slit it and then cross cut it into ½" squares.



#245 Pelleter

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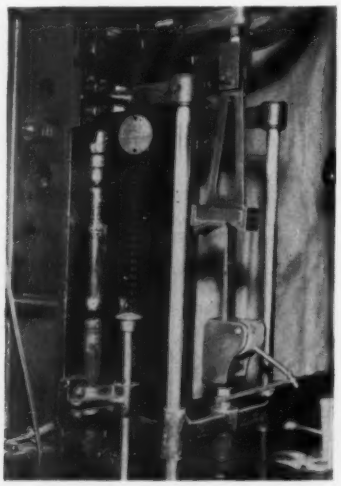
Scott Adhesion Test Apparatus

A simplified method of testing the adhesion of vulcanized rubber and similar elastomers to metal is now offered by Scott Testers, Inc., Providence, R. I. Heretofore, this test had called for an extremely heavy capacity machine which tested large specimens. Preparation of these specimens was complicated, requiring special turned parts which were not commonly available. The new method uses as specimens inexpensive sheet stock



and permits the use of the usual Scott Tester found in rubber laboratories. Developed by the Lord Manufacturing Co., Erie, Penna., manufacturers of bonded rubber products and shear type rubber mountings for vibration control, and used by them successfully for a number of years, the method is now adopted by the A.S.T.M. under designation D429-55T. Scott Testers, Inc., have received permission to manufacture the attachment, illustrated herewith, and are currently in a position to supply the fixture and the mold for preparing and testing the specimen. Evaluation of the bond is recorded on the standard Scott "picturized" chart which gives a permanent record convenient for filing and readily reproducible for correspondence.

Standard Threaded Inserts

Threaded inserts for rubber, plastics, die castings and potting compounds have been announced as standard stock items by the Standard Insert Co., Pacoima, Calif. The inserts are designed to be molded directly into the product, and are said to require no secondary operations for inserting or locking. They are knurled to prevent rotation, and to hold them in place. Additional strength against pullout is obtained by two circular relief bands on each insert. The inserts are available in sizes from No. 2 to ⅜-inch in all regular thread sizes, both NC and NF, and are made in two series, tapped straight through and blind. All inserts, according to the company, are free of chips, and accurate hole sizes are maintained to facilitate mounting on pins of molding presses at time of installation. The standard material is brass, but may be made to order from steel, aluminum or stainless steel if desired.

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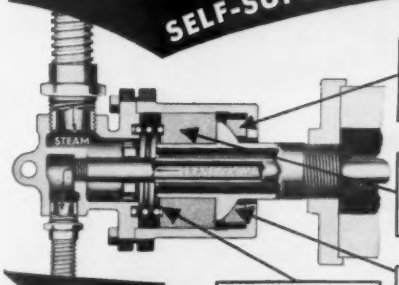

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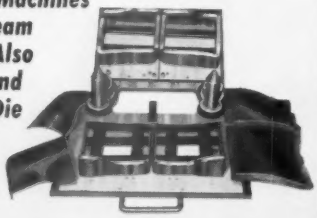

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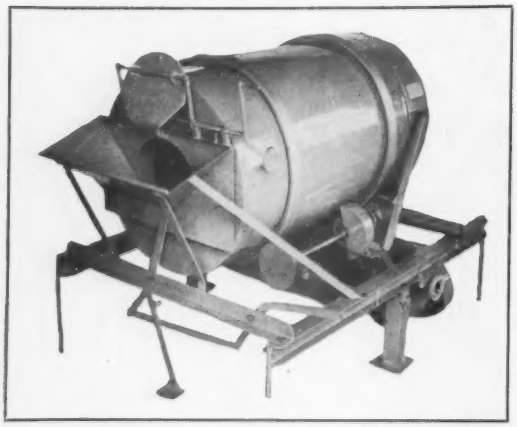

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Reviews

BOOKS

Modern Chemical Processes: Volume 4. Published by the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 8 x 11 in. 212 pp. $5.00.

Nineteen recently developed chemical processes, all now in operation on a full-scale production level, are described in this book in the light of the following details: background, including commercial and technical history and the origin of present installation; description of plant installation, including design details of non-standard items; description of process and operation of plants; economics of process, including raw materials and processing cost breakdowns, plant investment and amortization; personnel, and future prospects, including technological improvement of the process and changes in the industrial picture. Such widely diversified products as graphite electrodes, specialty soaps, aluminum, vitamin B_{12} feed supplement, Portland cement, and anthraquinone vat dyes are discussed in the book. Photographs and flow sheets of the particular application being described are included in the description of each chemical process. The book has been compiled by the editors of *Industrial and Engineering Chemistry* in conjunction with the technical staffs of cooperating organizations. A subject index is included.

•

An Encyclopedia of the Chemical Process Industries. By Jeffrey R. Stewart. Published by the Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. 5⅞ x 8¾ in. 838 pp. $12.00.

This book is based entirely on the fourth edition of *Stewart's Scientific Dictionary*, but contains a detailed addenda section describing the newest commercial products and defining terms which were inadvertently omitted from the earlier edition. It covers raw materials, processes, equipment and finished products of the chemical process industries in an encyclopedic form. It also lists definitions of technical and scientific terms which are frequently encountered in these industries. It should provide information to all those who are actively engaged in the chemical process industries, whether they handle research, production, control, purchasing, or sales. The bulk of the information was secured at the Library of Congress in Washington, D.C., by literary search. Much additional information was obtained from a cross section of the opinion of leading technical men and scientists. No distinction has been made between proprietary names which have been legally protected by trade marks or those which have not.

•

Economic Geography of Industrial Materials. Edited by Albert S. Carlson. Published by the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 10½ x 7 in. 512 pp. $12.50.

Written by top experts in a wide range of key industries, this handbook answers many perplexing problems that industry must face in today's ever-changing economic atmosphere. Each chapter, illustrated with maps, tables, charts and statistics, describes economic-geographic conditions necessary for profitable production. Such factors as location, climate, soil, topography, water resources, minerals, fuels, labor, capital, management, transportation and markets are discussed and evaluated to show profitable trends and conditions at the present time and in the future. Chapter One provides a description of the world distribution of the basic resources and population, and of the economic and demographic conditions under which all industry operates. Chapter Two describes the part transportation plays in production and distribution. Key industries are discussed in succeeding chapters, from fuels and raw materials to finished products. A subject index is provided.

BOOKLETS, CATALOGS, etc.

Kel-F Elastomer: Compounding, Vulcanization and Fabrication. Chemical Manufacturing Division, M. W. Kellogg Co., P.O. Box 469, Jersey City 3, N.J. 8½ x 11 in. 12 pp.

Methods of compounding, vulcanizing and fabricating Kel-F Elastomer are described in this booklet. Discussed are the use of polymer blends, fillers and colorants, and softeners and plasticizers, as well as guides in selecting the right compound for a particular application. Curing systems described include peroxide, amine, and isocyanate vulcanization and vulcanization by beta and gamma radiation. Typical compounds containing the various curing systems are outlined in six tables. Included in the tables are data on such physical properties as tensile, elongation, hardness, Bayshore resilience, compression set, and Gehman stiffness. Brief descriptions of the use of the material in transfer molding, extrusion, calendering, cement coatings, and adhesion to metal are also given.

•

BRC 22 Hydrocarbon and Plaskon Polyethylene Lubricant 8417 in a Black-Filled Neoprene GN Compound. (Laboratory Release No. 16). Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 8½ x 11 in. 12 pp.

Included in this technical report is a summary of physical test data obtained from tests performed on a Neoprene Type GN compound. Using 5, 10 and 20 parts of BRC 22 Hydrocarbon in a basic compound, a comparison of the physical properties of these three compounds with that of a reference compound is given. The results of such physical tests as Mooney viscosity, tensile, elongation, hardness, abrasion resistance, tear resistance, compression set, rebound, crack growth resistance and brittleness temperature are given. Tension and hardness data of the four compounds, both unaged and air over-aged 70 hours at 100°C., are given in tabular form.

•

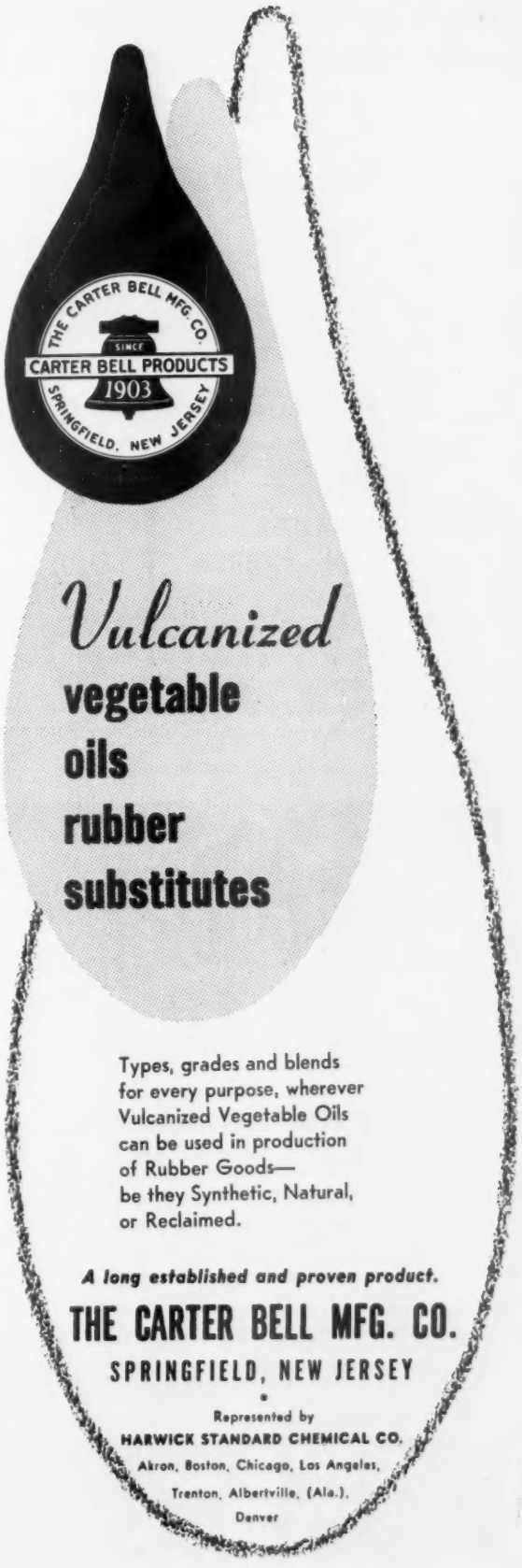
Statistical Summary No. 1: Wage, Hour, Employment, Production and Price Trends in the Chemical Industry. Manufacturing Chemists' Association, Inc., 1625 I Street, N.W., Washington 6, D. C. 8¼ x 10¾ in. 56 pp. 60c

This report is intended to supplement the "Chemical Statistics Handbook," fourth edition, published in June, 1955. It is the first of a new series of chemical industry statistical summaries containing up-to-date figures on a selected list of inorganic and organic chemicals, employment, wages, hours, earnings, wholesale prices, production indexes, imports, and exports. Included are Federal Reserve Board production indexes, U.S. production of inorganic chemicals for 1954-55, U.S. production of specified synthetic organic chemicals for 1954-55, estimated number of wage earners (1950-1955), and wholesale price indexes (1950-1955). The statistics in the summary are outlined in tables as well as charts.

•

Het Anhydride. (Bulletin No. 43). Hooker Electrochemical Co., Box 344, Niagara Falls, N. Y. 8¾ x 11½ in. 28 pp.

A description of the general properties, typical reactions and suggested uses of Het Anhydride are included in this bulletin. The bulletin defines the chemical's properties as a hardener or curing agent for liquid epoxy resins with respect to strength and stiffness at high temperatures, fire resistance, high heat distortion temperatures, and good mechanical and physical properties. Some major fields of applications include glass-reinforced laminates; casting resins for potting and encapsulation of electrical systems; plastic tools and dies requiring heat resistance; heat and fire-resistant adhesives, and protective coatings requiring heat or fire resistance, as well as varnishes for electrical equipment.



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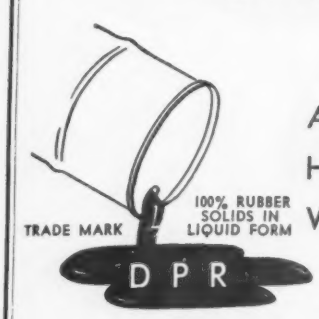

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REVIEWS (CONT'D)

Vinylfoam: The Elastomer Process. Elastomer Chemical Corp., 212 Wright St., Newark 5, N. J. 11 x 8½ in. 16 pp.

According to this booklet, the year 1955 witnessed the birth of a new industry — the foam industry. Foam emerged from the status of a single product (foam rubber) to the status of an industry, as several synthetic and chemically compounded foam products were introduced, including vinyl foam based on vinyl resin. The volume of foam production rose from about 18,000,000 pounds in 1947 to about 200,000,000 pounds in 1955. By 1958, the booklet indicates, foam production should approximate 350,000,000 pounds. With new markets anticipated, this booklet describes the characteristics and uses of Vinylfoam in terms of successful applications to date in the fields of transportation seating, automotive fixtures, apparel, and household accessories. The bulletin points out such advantages of the material as flame resistance, dimensional stability, tear and abrasion resistance, chemical resistance, and flexibility. A discussion of the various methods of fabricating the material is also included.

•

Growth of the Rubber Industry of Great Britain and the United States. By William Woodruff, University of Illinois, Urbana, Ill. 6½ x 9¾ in. 18 pp.

Reprinted from the December, 1955, issue of the Journal of Economic History, this article is an examination of the basic factors that have influenced the growth of the rubber industry in the United States and Great Britain. A review of the rubber industry's position before and after the introduction of the automobile is given, covering the years 1900 to 1950. Also included in the article is a discussion of the part played by the industry in the rise of the American system of manufacturing; the transfer of skill and technique from the new world to the old; the conditions attending the mass production of crude rubber in one part of the world and its mass consumption in another; the decline of empiricism and the rise of scientific inquiry; product changes in the industry, and changes in marketing consequent upon the industry's rapid growth.

•

Over Fifty Years of Service Through Creative Chemistry. Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. 8½ x 11 in. 36 pp.

Included in this booklet is a brief history of Naugatuck Chemical from its inception in 1904 to the present time. As an indication of the growth of the rubber industry, the publication states that the company has experienced an 800% increase in sales in the last 25 years. The numerous products manufactured by the company are outlined as to what they are and where they may be used. Included are such products as accelerators, antioxidants, synthetic rubber, reclaimed rubber, natural and synthetic latex, compounded latex, plasticizers, butadiene-styrene rubbers, polyvinyl chloride resins, polyester resins, agricultural chemicals, heavy chemicals, rubber labels, flexible concrete, and intermediate chemicals. Illustrations of the company's research facilities are given as well as views of five of its seven plants.

•

Ethers and Oxides. Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 68 pp.

Discussed in this booklet are the applications of thirty-two products including ethylene oxide and propylene oxide. It gives data on physical properties, solubilities, shipping, specifications and test methods, and constant boiling mixtures. Thirty-four physical property charts are also included. A list of literature and patent references for individual compounds giving additional sources for more detailed information is given. As intermediates, ethers and oxides are used in the manufacture of rubber and textile chemicals, plasticizers, adhesives, lubricants, synthetic fibers, and resins and plastics.

Reduce Speed. (Bulletin No. E-2408). Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland 10, Ohio. 8½ x 11 in. 8 pp.

The new line of the company's gearmotors, the first incorporating new NEMA motors and completely redesigned gearheads, is described in this bulletin. One section presents examples of the wide selection of types, mountings, enclosures and ratios available. A detailed two-page cutaway view points out the extra features and attention to engineering design details. Another section illustrates the simplified maintenance through ease of motor and gear replacement—with an exploded view of a typical gear assembly. A third section explains the unit type construction that allows for selection of gearmotors to exactly meet the user's specific requirements.

•

Solvay Hydrogen Peroxide: Properties, Uses and Handling. Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y. 6 x 9 in. 24 pp.

Illustrated with tables and diagrams the text of this booklet covers some of the chemical reactions of hydrogen peroxide and suggests applications which include the use of this material to produce porosity in foam rubber and porous structural materials, as a polymerization catalyist, as a bleaching agent in the textile and paper industries, in the syntheses of organic and inorganic chemicals, and in many other industries and manufacturing processes. In addition, the booklet describes the storage, safe handling and unloading of hydrogen peroxide in drums, tank trucks and tank cars.

•

Modern Multiple V-Belt Drives. Allis-Chalmers Manufacturing Co., 979 South 70th St., Milwaukee, Wisc. 5½ x 8½ in. 36 pp.

The origin, history and development of the modern multiple V-belt drive is discussed in this booklet. In addition, the booklet covers the evolution of standards in engineering V-belt drives, tells how to engineer such drives, provides tables and data, and describes modifications in the drives. The final chapter of the booklet furnishes the answers to a number of questions relating to some of the basic principles and practices involved in the engineering and use of multiple V-belt drives.

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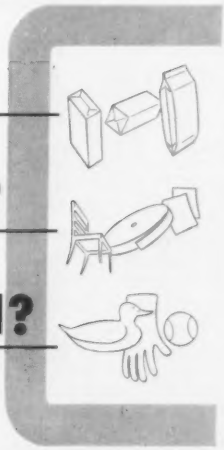

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MARKET REPORTS

TRENDS
NEWS
PRICES

NEW YORK, APRIL 30, 1956

Natural Rubber

Since our last report (April 2), the price of spot rubber on the New York Commodity Exchange has moved in a range of 290 points, high for the period being 32.75c reached on April 13, and low being 29.85c reached on April 30. The average price of middling uplands for the month of April was 31.74c based on 21 trading days. This compares with an average of 33.68c in the previous month.

British rubber manufacturers during a recent visit to Malaya warned natural rubber producers that synthetic rubber production would be stepped up in Great Britain unless Malayan producers showed greater good will and unless the price of the natural product was reduced.

Urges Lifting of Duty

It was disclosed in Kuala Lumpur that the Natural Rubber Producers Council, which represents natural rubber producers in Malaya, will urge that Britain should lift the import duty on synthetic rubber, but only to a carefully calculated limit.

The Council will ask the Malayan government to take this matter up with the proper British authorities. This would save about 1,000,000 pounds sterling to British manufacturers who have informed the natural rubber producers that they plan to compound most of the 75,000 tons of synthetic to be imported into Britain this year with natural.

The British manufacturers further stated that there would be an all-around increase in consumption this year, which would benefit the natural producers.

H. A. Campbell, president of the Natural Rubber Producers Council, stated "manufacturers have made a very good case of hazards they experienced under the important duty and emphasized that it militates against their ability to compete effectively with other manufacturing countries."

Meanwhile, the International Rubber Study Group reported that world production of natural rubber during the first two months of 1956 totaled 275,000 tons, 47,500 tons less than the 322,500 tons consumed during the period. The Group said that February production was 132,500 tons and consumption 160,000 tons, of which 12,825 tons were estimated to have gone to Russia and 6,250 tons to Red China.

World Stocks Decline

World stocks of natural rubber at the end of February were reported by the Group at 737,500 tons, a drop of 50,000 tons since the start of the year. The stocks included 247,500 tons in producing areas, 407,500 in consuming areas (exclusive of strategic stockpiles) and 182,500 tons afloat.

The Group stated that Indonesian exports of natural totaled 40,427 tons in February, including 17,893 tons of estate origin.

Price Data

Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)

FROM APRIL 3 TO APRIL 30

April	Spot	May	July	Sept.	Dec.	Sales
3	31.25	30.90	30.61	30.20	29.65	167
4	31.50	31.30	31.15	30.65	30.00	188
5	32.00	31.80	31.55	31.00	30.50	437
6	32.25	31.80	31.55	30.95	30.45	180
7	....	....	....	....	....	...
8	....	....	....	....	....	...
9	32.38	32.20	31.70	31.15	30.55	76
10	32.25	31.90	31.65	31.20	30.50	185
11	32.61	32.45	32.25	31.70	30.80	290
12	32.38	32.50	32.30	31.65	30.80	182
13	32.75	32.70	32.45	31.75	30.95	131
14	....	....	....	....	....	...
15	....	....	....	....	....	...
16	32.25	32.00	31.85	31.15	30.35	207
17	32.25	31.95	31.60	31.00	30.20	326
18	32.50	32.05	31.90	31.15	30.40	76
19	31.75	31.60	31.40	30.80	30.10	213
20	31.85	31.80	31.65	31.00	30.25	124
21	....	....	....	....	....	...
22	....	....	....	....	....	...
23	31.61	31.36	31.25	30.67	30.05	88
24	31.38	30.90	30.80	30.35	29.75	250
25	31.00	30.40	30.45	30.05	29.52	271
26	31.00	30.30	30.45	30.10	29.65	226
27	30.25	29.40	29.60	29.35	29.15	307
28	....	....	....	....	....	...
29	....	....	....	....	....	...
30	29.85	29.50	29.60	29.45	29.25	338

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.29⅞
June	.30
July	.29⅝
Thin Latex Crepe:	
Spot	.36
Thin Brown Crepe, No. 2	.27¼
Flat Bark Crepe	.20⅝

London Market
(Standard Smoked Sheets)

July-Sept.	30.10 - 30.25
Oct.-Dec.	29.52 - 29.66

Singapore Market
(Standard Smoked Sheets)

June	28.38 - 28.49

Middling Upland Quotations

	Apr. 2	April 30		
	Close	High	Low	Close
May	35.59	35.89	35.85	35.89
July	33.59	33.98	33.61	33.94
Oct.	32.16	32.38	32.16	32.36

Notes and Quotes

Donald R. Scheu, field engineer for the B. F. Goodrich Industrial Products Co., Akron, Ohio, in a recent address at the University of Michigan, estimated that by 1965 the demand for mechanical engineers in the rubber industry will be more than double the number now employed if the industry is to continue its present rate of progress. Mr. Scheu stated that more than 3,000 mechanical engineers are now at work designing and engineering tires, conveyor belts, hose and thousands of other rubber products which help keep the nation's economy in high gear. In addition, more than 4,000 persons with mechanical engineering education are working in the rubber industry in other capacities such as industrial sales, plant engineering, maintenance engineering, etc.

Synthetic Rubber

In acordance with the 1953 law authorizing sale of the government-owned synthetic ruber plants, President Eisenhower, on April 30, reported to Congress on the status of the synthetic rubber industry. The President reported that synthetic rubber production is expanding, and by 1958 could meet this country's foreseeable rubber needs for 1960. He said the transfer of synthetic plants from government ownership to private industry has been carried out "to a highly satisfactory degree."

The President stated that by January 1, 1958, reported planned expansions would bring synthetic capacity to about 1,700,000 tons. This would be equal to total new rubber requirements estimated for 1960. He said some of the plant expansion required to meet that goal "are to some degree dependent on the growth of demand here and overseas."

Future Supplies Assured

"They include," he said, "commitments already reduced to definite contracts; but also less definite expectations which may not come to fruition. In a broad sense, however, these steps reflect the policy of the industry to assure that the future supplies of synthetic rubber will be ample to meet all demands."

President Eisenhower gave his approval to two steps recommended by the National Science Foundation's Special Commission for Rubber Research:

(1) Termination of the Foundation's government-sponsored rubber research projects in favor of a more general research program.

(2) Disposal of the Akron, Ohio, laboratories which are still under government ownership. The commission found that although the Akron laboratories include large-scale pilot plant facilities, "these are not unique in the industry."

President Eisenhower said the sale of government-built rubber plants to private industry brought the Treasury $22,500,000 more than the $700,000,000 originally invested. His figures did not include such additional returns as might come from the sale or lease of the alcohol-butadiene plant at Louisville, Ky., and disposal of the Akron laboratories.

The President declared that all the plants are sure to be available for rubber production in the event of an emergency and "in general, are now operating intensively and have already effected marked increases in capacity."

Production Record Set

The Rubber Manufacturers Association reports that a new production record of 94,339 long tons of synthetic rubber was established by American producers in March of this year. This compares with the previous monthly high of 93,522 long tons produced in January, 1956 and with 90,488 long tons produced in February. Production of synthetic rubber in March, 1955, was 78,757 long tons. Consumption of synthetic in March, 1955, was 128,135 long tons, RMA stated.

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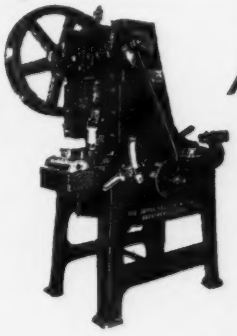

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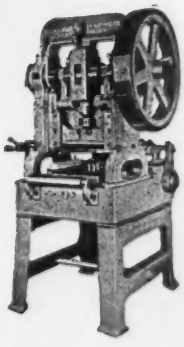

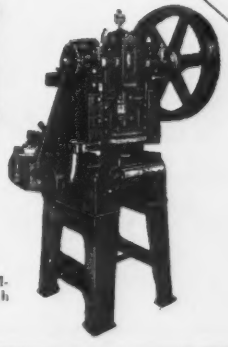

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Precision cutting across grain of stock.

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(dry types—per pound carload unless otherwise specified)

Butadiene-Acrylonitrile Types

Butaprene NAA	.5400 [1]
Butaprene NF	.4900 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1	.6400 [2]
Chemigum N3	.5800 [2]
Chemigum N5	.5800 [2]
Chemigum N6	.5000 [2]
Chemigum N7	.5000 [2]
Hycar 1001	.5800 [2]
Hycar 1002	.5000 [2]
Hycar 1014	.6000 [2]
Hycar 1041	.5800 [2]
Hycar 1042	.5000 [2]
Hycar 1043	.5000 [2]
Hycar 1312	.6000 [2]
Hycar 1411	.6200 [2]
Hycar 1432	.5900 [2]
Hycar 1441	.6200 [2]
Paracril B	.5000 [3]
Paracril BJ	.5000 [2]
Paracril C	.5800 [3]
Polysar Krynac 800	.5000 [2]
Polysar Krynac 801	.5800 [2]
Polysar Krynac 802	.5000 [2]
Polysar Krynac 803	.5000 [2]
Naugapol 1018	.2700 [2]

Butadiene-Styrene Types

Ameripol 1001	.2410 [2]
Ameripol 1002	.2435 [2]
Ameripol 1006	.2410 [2]
Ameripol 1500	.2410 [2]
Ameripol 1501	.2410 [2]
Ameripol 1502	.2410 [2]
Ameripol 1703	.2060 [2]
Ameripol 1705	.2035 [2]
Ameripol 1706	.2035 [2]
Ameripol 1707	.1910 [2]
Ameripol 1709	.1885 [2]
Ameripol 1710	.1885 [2]
Ameripol 1711	.1885 [2]
Ameripol 1712	.1885 [2]
ASRC 1500	.2410 [2]
ASRC 1502	.2410 [2]
Baytown 1600	.1850 [2]
Baytown 1601	.1850 [2]
Baytown 1602	.1850 [2]
Baytown 1801	.1700 [2]
Butaprene S-1000	.2300 [2]
Butaprene S-1001	.2300 [2]
Butaprene S-1004	.2300 [2]
Butaprene S-1006	.2300 [2]
Butaprene S-1009	.2600 [2]
Butaprene S-1010	.2650 [2]
Butaprene S-1012	.2700 [2]
Butaprene S-1013	.2600 [2]
Butaprene S-1015	.2800 [2]
Butaprene S-1500	.2300 [2]
Butaprene S-1502	.2300 [2]
Butaprene S-1703	.1950 [2]
Butaprene S-1705	.1925 [2]
Butaprene S-1710	.1775 [2]
Copo 1500	.2410 [2]
Copo 1502	.2410 [2]
Copo 1712	.1885 [2]
Naugapol 1016	.2650 [2]

Butadiene-Styrene (Cont'd)

Naugapol 1018	.2700 [2]
Naugapol 1019	.2650 [2]
Naugapol 1021	.3000 [2]
Naugapol 1022	.2800 [2]
Naugapol 1023	.2850 [2]
Naugapol 1503	.2700 [2]
Naugapol 1504	.2950 [2]
Philprene 1000	.2500 [1]
Philprene 1001	.2500 [1]
Philprene 1006	.2500 [1]
Philprene 1009	.2550 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1100	.1990 [1]
Philprene 1104	.1940 [1]
Philprene 1500	.2500 [1]
Philprene 1502	.2500 [1]
Philprene 1503	.2700 [1]
Philprene 1600	.2000 [1]
Philprene 1601	.1980 [1]
Philprene 1602	.2000 [1]
Philprene 1605	.1940 [1]
Philprene 1703	.2120 [1]
Philprene 1706	.2100 [1]
Philprene 1708	.1970 [1]
Philprene 1711	.1940 [1]
Philprene 1712	.1940 [1]
Philprene 1803	.1790 [1]
Plioflex 1000	.2425 [2]
Plioflex 1006	.2425 [2]
Plioflex 1502	.2425 [2]
Plioflex 1703	.2075 [2]
Plioflex 1710	.1900 [2]
Polysar Krylene	.2410 [2]
Polysar Krylene NS	.2410 [2]
Polysar Krynol	.2000 [2]
Polysar Krynol NS	.2050 [2]
Polysar S	.2410 [2]
Polysar S-50	.2410 [2]
Polysar S-65	.2410 [2]
Polysar S-X 371	.2550 [2]
Polysar SS-250	.3000 [2]
S-1000	.2300 [2]
S-1001	.2300 [2]
S-1002	.2325 [2]
S-1006	.2300 [2]
S-1011	.2325 [2]
S-1013	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1501	.2300 [2]
S-1502	.2300 [2]
S-1600	.1850 [2]
S-1601	.1850 [2]
S-1602	.1850 [2]
S-1703	.1950 [2]
S-1705	.1925 [2]
S-1706	.1925 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1801	.1700 [2]
S-2000	.2275 [2]
S-2101	.2250 [2]
Synpol 1000	.2425 [2]
Synpol 1001	.2425 [2]
Synpol 1002	.2450 [2]
Synpol 1006	.2425 [2]
Synpol 1007	.2425 [2]

Butadiene-Styrene (Cont'd)

Synpol 1009	.2475 [2]
Synpol 1012	.2425 [2]
Synpol 1013	.2500 [2]
Synpol 1500	.2425 [2]
Synpol 1551	.2425 [2]
Synpol 1703	.2075 [2]
Synpol 1707	.1925 [2]
Synpol 1708	.1950 [2]
Synpol 1711	.1900 [2]

Butyl Rubbers

Enjay Butyl 035	.2300 [2]
Enjay Butyl 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Butyl 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl 100	.2450 [2]
Polysar Butyl 101	.2775 [2]
Polysar Butyl 200	.2450 [2]
Polysar Butyl 300	.2450 [2]
Polysar Butyl 301	.2550 [2]
Polysar Butyl 400	.2450 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GN-A-P	.3400 [2]
Neoprene Type GN-P	.3400 [2]
Neoprene Type GN-Special	.3400 [2]
Neoprene Type GN-A-Special	.3400 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type W-P	.3400 [2]
Neoprene Type W-Special	.3400 [2]
Neoprene Type WRT	.4500 [2]

Silicone Rubbers

	(prices l.c.l.)
GE (compounded)	2.50 [2]
GE Silicone Gum (not compounded)	4.00 [2]
Silastic (compounded)	1.95 [2]
Union Carbide (gums)	4.00 [2]
Union Carbide (compounds)	2.50 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.4700 [2]
Thiokol Type FA	.6400 [2]
Thiokol PR-1	.9500 [2]
Thiokol Type ST	1.00 [2]

(latices—all prices per pound dry weight)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [2]
Butaprene N-400	.5400 [2]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [2]
Chemigum 235	.5400 [2]
Chemigum 236	.5400 [2]
Chemigum 245	.4600 [2]
Chemigum 246	.4600 [2]
Hycar 1512	.4600 [2]
Hycar 1551	.5400 [2]
Hycar 1552	.4600 [2]
Hycar 1561	.5400 [2]
Hycar 1562	.4600 [2]
Hycar 1571	.5900 [2]
Hycar 1572	.5100 [2]
Hycar 1577	.4600 [2]

Butadiene-Styrene Types

Butaprene S-2000	.2600 [2]
Butaprene S-2001	.2600 [2]

Butadiene-Styrene (Cont'd)

Butaprene S-2002	.2850 [2]
Butaprene S-2003	.2950 [2]
Butaprene S-2004	.2950 [2]
Butaprene S-2006	.2600 [2]
Copo 2101	.2800 [2]
Copo 2102	.3100 [2]
Copo 2105	.3100 [2]
Copo X-765	.2900 [2]
Pliolite 2101	.3000 [2]
Pliolite 2104	.3200 [2]
Pliolite 2105	.3200 [2]
Pliolite X-765	.3000 [2]
Naugatex 2000	.2630 [2]
Naugatex 2001	.2630 [2]
Naugatex 2002	.2880 [2]
Naugatex 2005	.3000 [2]
Naugatex 2006	.2630 [2]
Naugatex 2101	.2850 [2]
Naugatex 2105	.3120 [2]
Naugatex X-767	.3230 [2]

Butadiene-Styrene (Cont'd)

S 2000	.2275 [2]
S 2004	.2600 [2]
S 2101	.2250 [2]

Neoprene

Neoprene Latex 60	.4000 [2]
Neoprene Latex 571	.3700 [2]
Neoprene Latex 572	.3900 [2]
Neoprene Latex 601-A	.4000 [2]
Neoprene Latex 735	.3800 [2]
Neoprene Latex 736	.3800 [2]
Neoprene Latex 842-A	.3700 [2]
Neoprene Latex 950	.4700 [2]

Polysulfide Rubbers

Thiokol Type MX	.7000 [2]
Thiokol Type WD-2	.9200 [2]
Thiokol Type WD-6	.7000 [2]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid.

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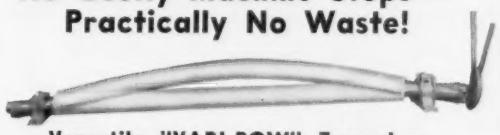

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MARKETS (continued)

Reclaimed Rubber

The U. S. Department of Commerce reports that 53,210 long tons of reclaimed rubber were produced in the United States in the first two months of the current year, some 3,000 tons more than were produced in the first two months of 1955. If the industry were to operate at this pace for the balance of the year, total production by year end would be in the neighborhood of 350,000 long tons.

Most trade estimates do not see production in 1956 attaining this figure. It is felt, in most quarters, that with the end of this year total production will about match that of 1955 when about 325,000 long tons were produced. At the end of February, stocks stood at 32,404 long tons, about 3,000 long tons more than were on hand at the end of February, 1955. Consumption in the first two months of 1956 is put at 51,804 long tons, 2,000 more than in the first two months of 1955.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11
First Line Whole Tire	.10½
Second Line Whole Tire	.10
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.09¼
Black Carcass	.14¼
No. 1 Light Colored Carcass	.20¾
No. 1 Peel	.11
Butyl Tube Reclaim	.15
Natural Rubber Black Tube	.15
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Routine activities have characterized the scrap rubber market during the past few weeks. Suppliers, for the most part, were working to complete their mixed automobile tire shipments. A somewhat better movement has been noted in Butyl tubes. Somewhat increased activity was noted in tire buffings and in black passenger tubes.

In consideration of the general downturn in the automobile industry and its resultant effect on reclaim and scrap, dealers are loathe to predict what may lie ahead in the months to come. There are no indications of radical price movements. A "wait and see" attitude seems to prevail in most quarters. Current prices for scrap rubber follow:

(Prices Delivered Akron)

Mixed tires	ton	18.00
Light colored carcass	lb.	.05¾
No. 1 peelings	ton	45.00
No. 2 peelings	ton	30.00
No. 3 peelings	ton	21.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	17.50
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.05

Tire Fabrics

The past period has seen another series of price cuts, these announced by producers of rayon tire cord. The battle between rayon and nylon tire cord is now further complicated by what appears to be a strong competitive battle between rayon producers, for while some companies announced price cuts for their products, others were holding to previously announced price levels.

The tire cord industry (based on 1954 figures) uses about 500,000,000 pounds of yarn a year, about 430,000,000 pounds of which are now produced by the rayon firms. DuPont, which initiated the latest decreases, is said to have been prompted to put greater emphasis on tire cord sales in consideration of the fact that other outlets have been backed up in recent months.

Cotton Ducks Steady

The trade reports that cotton ducks are displaying a steady tone, although trading in most types is limited to relatively small fill-in lots for nearby delivery. An exception to the general trading situation is evident in the numbered Grade B ducks which are in fairly good demand for waterproofing purposes. Fairly sizable lots of these cotton ducks are selling for delivery in May.

Sales of Army ducks at present are confined to fill-in orders, but mills have comfortable order backlogs on these types extending through May, a market check indicates. Prices on these types are steady and unchanged.

In wide goods, the slow pace of trading continues but there is some notable activity, trade sources point out, since many plastics coaters are coming into the market to buy goods to round out current operating needs. This buying involves small lots for prompt delivery for the most part. Prices for small lots generally are unchanged but concessions are believed obtainable where any sizable quantities are involved.

1955 Tire Cord Output

The Textile Economics Bureau reports that 523,000,000 pounds of tire cord and fabric were produced in 1955, a rise of 26½% over 1954. By far the major factor in this rise was the increased production of rayon tire cord and fabric which rose 25½% over the 1954 level. Although of a lesser magnitude, the output of nylon tire cord and fabric has increased steadily with 50,000,000 pounds produced in 1955 against 30,000,000 pounds in 1954.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.76
1650	lb.	.70
2200	lb.	.70½

Nylon Tire Cord

210	lb.	1.95
840	lb.	1.80

Rayon Graded Fabric

1100	lb.	.72
1650	lb.	.66½
2200	lb.	.66

Cotton Chafers

14.4 oz. (per square yard)	lb.	.70
9.25 oz. (per square yard)	lb.	.65
11.65 oz. (per square yard)	lb.	.61
8.9 oz. (per square yard)	lb.	.67

Liquid Latex

Natural: London states that the latex business has been rather quiet in recent weeks. There are renewed indications that consumption in the United Kingdom and on the Continent is slowing down. Buying has been limited to meeting absolutely necessary requirements in the expectation of a further decline in prices.

In the United States, meanwhile, the Commerce Department reports that 12,625 long tons of natural latex were consumed in the first two months of this year. This figure is about 2,000 long tons less than in the first two months of 1955. Stocks of 16,396 at the end of February, 1956, are just about double what were on hand at the end of February, 1955. Current prices for Hevea latex, in bulk, average 37c per pound, East Coast port.

Synthetic: Consumption of GR-S type latices in the first two months of the current year has been put at 11,977 long tons by the Commerce Department. This is about 2,500 long tons more than were consumed in the first two months of the preceding year. At this pace, consumption of GR-S type latices should total 75,000 long tons by year end.

Consumption of neoprene latex in the first two months of 1955 at 1,557 long tons, is only about 100 long tons ahead of 1954 consumption. N-type latices are running about 300 tons better in the two-month period, 1,299 in 1955 and 983 long tons in 1954.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the extremely narrow range of 35 points since our last report (April 2), high for the period being 36.95c reached on April 11, 12 and 13, and low being 36.60c reached on April 25. The average price of middling uplands for the month of April was 36.81c based on 21 trading days. This compares with 36.70c in March.

Sentiment is reported to be slightly reactionary in cotton. It is believed that when the new crop begins to move in the early fall, there will be no export demand because the government will be selling surplus stocks. On the other hand, there is expected to be a good demand for the early receipts to replace cotton bought from CCC.

The New York Cotton Exchange estimates that there were 18,138,000 bales of cotton in the United States on March 31, against 14,481,000 on March 31, 1955. Of the 1956 total, the government stock added up to 13,274,000 bales. Last year, of a total of 14,481,000 bales, 8,526,000 were government stocks. The "free" stock on March 31 was 4,864,000 against 5,955,000 last year.

Administration foreign aid officials tentatively have committed $93,500,000 in mutual security funds to cover dollar purchases of raw cotton for Spain, Yugoslavia, India, Korea, Formosa and other countries in the year starting July 1. The amounts are Spain, $13,500,000; Yugoslavia, $9,000,000; Near East and Africa, $2,000,000; India, $15,000,000; Korea, $32,000,000; Philippines, $2,500,000; Formosa, $17,200,000, and Bolivia, $2,000,000.

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	634,800	596,285	10,611	110,105
1955:				
Jan.	49,941	56,911	909	101,050
Feb.	50,880	50,997	718	97,189
Mar.	61,250	58,472	691	102,058
Apr.	61,113	53,781	892	101,620
May	61,042	54,746	683	106,650
June	52,762	56,282	682	101,491
July	43,626	46,166	906	105,782
Aug.	59,840	48,359	810	109,056
Sept.	50,459	50,963	980	113,185
Oct.	45,720	54,995	869	110,795
Nov.	50,509	52,769	1,102	103,764
Dec.	50,556	48,565	986	109,854
1956:				
Jan.	58,803	53,370	1,877	111,413
Feb.	.....	50,077	....	111,278

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry Long Tons	Dry Declared Value	Latex Long Tons	Latex Declared Value	Total Imports
1935	453,134	115,299,448	13,553	3,782,222	466,687
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	145,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955:					
Jan.	42,088	22,245,606	7,853	5,473,260	49,941
Feb.	44,770	26,161,643	6,110	4,196,213	50,880
Mar.	53,639	33,482,831	7,611	5,987,304	61,250
Apr.	52,563	33,425,499	8,549	7,235,327	61,112
May	52,192	32,621,824	8,849	6,968,726	61,041
June	45,025	27,959,320	7,736	6,015,080	52,761
July	34,924	21,653,274	8,702	6,855,619	43,626
Aug.	50,954	32,782,273	8,886	7,071,971	59,840
Sept.	42,350	29,854,781	8,108	7,902,094	50,458
Oct.	38,820	30,746,494	6,900	7,539,732	45,720
Nov.	43,423	34,989,275	7,085	8,063,930	50,508
Dec.	41,759	34,512,483	6,436	6,853,858	48,195
1956:					
Jan.	48,476	38,397,341	10,328	10,355,488	58,804

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America	Rest of World*	Total*
1944	25,000*	50,000*	98,500	60,419	49,946	77,000	360,000
1945	8,600*	10,000*	97,500	12,000*	47,125	73,570	250,000
1946	403,719	175,000*	94,000	19,975	39,678*	105,080	837,500
1947	646,362	277,951	89,000	38,128	34,928*	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158*	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318*	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902*	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777*	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475*	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318*	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833*	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000*	344,584	1,897,500
1955:							
July	56,030	53,779	8,457	7,055	2,098	17,609	152,500
Aug.	54,357	63,218	9,698	7,564	1,129	21,407	165,000
Sept.	56,190	65,357	7,797	7,497	1,480	20,173	167,500
Oct.	54,835	66,814	9,307	8,509	1,611	28,924	170,000
Nov.	52,084	60,673	9,602	8,938	1,939	24,264	157,500
Dec.	62,222	94,681	11,654	11,855	500*	29,088	210,000
1956:							
Jan.	59,085	40,941	9,015	.....	500*	32,959	142,500

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1944	710,783	86,977	34,310	132,500	160,690	1,125,000
1945	799,009	91,047	41,836	87,500	108,164	1,127,500
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	614,250	480,000	2,980,000
1955:						
June	135,779	19,852	7,619	53,250	41,000	250,000
July	109,063	19,696	5,445	47,000	38,750	215,000
Aug.	121,081	17,538	5,554	39,750	37,000	217,500
Sept.	127,338	21,680	7,697	47,500	40,000	237,500
Oct.	135,372	25,484	7,416	63,000	39,000	262,500
Nov.	134,430	22,335	8,570	63,750	45,750	265,000
Dec.	131,653	24,913	7,718	57,250	41,000	252,500
1956:						
Jan.	.....	24,819	7,329	.....	.....	260,000

Source: International Rubber Study Group. * Estimated.

Rim Production

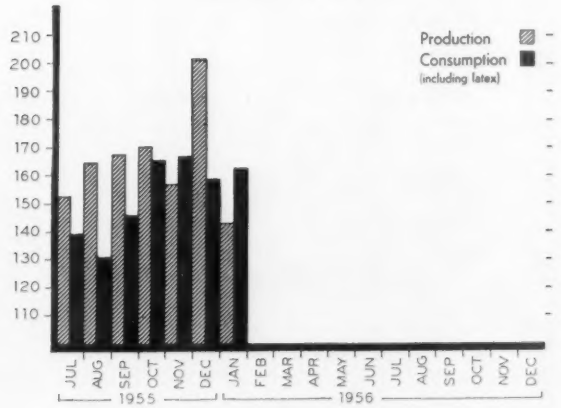
	1951	1952	1953	1954	1955
Passenger Car	29,145,367	24,936,844	31,318,461	25,952,322	38,092,080
Truck & Bus	6,877,419	5,752,674	5,228,321	4,463,689	6,642,329
Agricultural	3,019,581	2,073,116	1,943,487	1,297,040	1,931,768
Earth Mover	28,026	31,791	24,685	21,536	38,859
Total	39,070,393	32,794,425	38,514,954	31,734,587	46,705,036

	1955 Oct.	1955 Nov.	1955 Dec.	1956 Jan.	1956 Feb.	1956 Mar.
Passenger Car	2,831,566	3,424,887	3,224,232	2,911,466	2,507,445	2,755,696
Truck & Bus	495,813	539,802	492,964	620,729	553,303	541,861
Agricultural	141,336	149,358	203,534	183,462	164,168	198,272
Earth Mover	4,494	5,343	4,084	5,930	6,096	7,952
Total	3,473,209	4,119,390	3,924,814	3,721,587	3,231,012	3,503,781

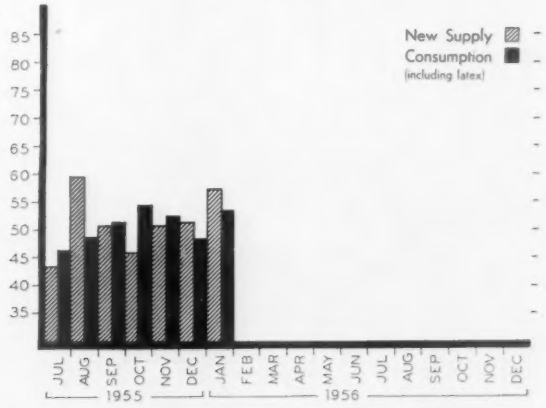
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

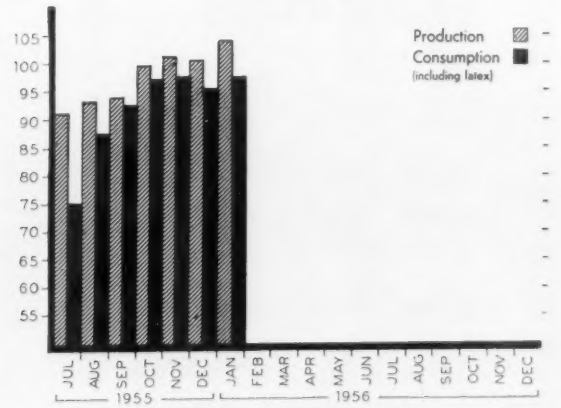
NATURAL RUBBER—WORLD
(thousands of long tons)



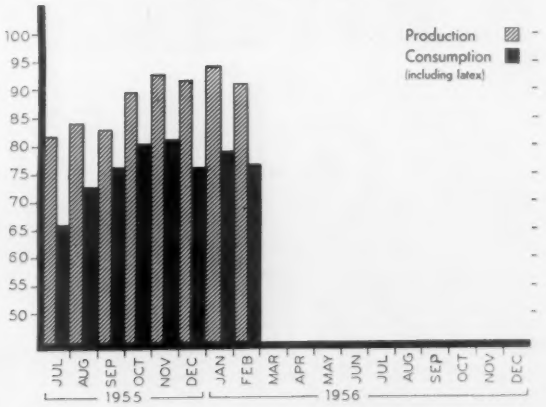
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



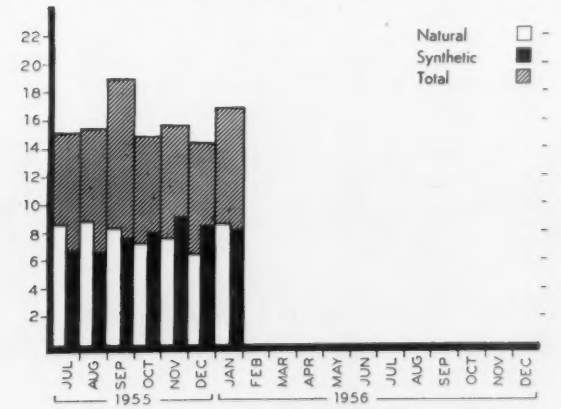
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



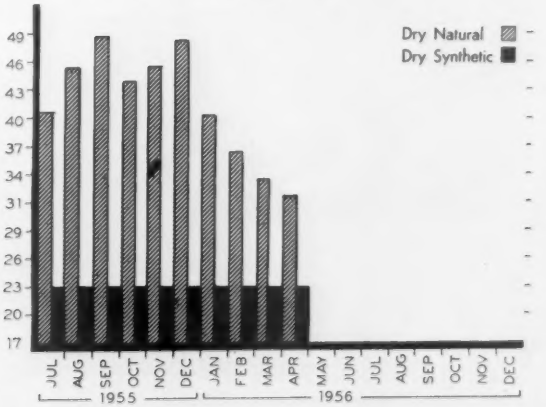
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	310,539	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1955	801,145	91,357	56,179	32,623	982,304
1955:					
Apr.	60,826	8,359	5,148	2,433	76,766
May	66,872	7,852	5,115	2,720	82,559
June	65,456	5,919	3,872	3,422	78,669
July	66,550	6,904	5,395	3,195	82,044
Aug.	68,898	8,511	4,203	2,792	84,404
Sept.	68,228	7,677	5,097	2,821	83,823
Oct.	73,103	8,118	5,501	2,958	89,680
Nov.	75,745	8,537	4,935	2,931	92,148
Dec.	74,794	8,455	4,710	3,068	91,027
1956:					
Jan.	76,028	8,207	6,896	3,125	94,256
Feb.	72,843	8,560	6,206	2,879	90,488

Consumption

1949	299,420	31,753	50,855	8,827	414,381
1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1955	741,997	72,876	53,991	26,035	894,899
1955:					
Apr.	59,746	5,884	4,321	2,172	72,123
May	63,825	6,143	4,455	1,965	76,388
June	72,256	6,320	4,704	2,581	85,861
July	55,610	4,294	3,894	1,621	65,419
Aug.	59,746	6,450	4,307	2,219	72,722
Sept.	63,330	6,197	4,578	2,270	76,375
Oct.	66,744	6,626	4,739	2,280	80,389
Nov.	68,111	6,896	4,420	2,234	81,661
Dec.	63,137	6,496	4,197	2,113	75,943
1956:					
Jan.	65,375	6,684	4,223	2,160	78,442
Feb.	62,999	6,338	4,213	2,487	76,028

Exports

1949	1,401	3,330	178	1,574	6,483
1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1955:					
Apr.	1,807	1,636	1,562	506	5,511
May	3,500	1,430	376	357	5,663
June	6,030	1,541	726	389	8,686
July	5,212	1,275	870	472	7,829
Aug.	7,727	1,454	837	386	10,407
Sept.	8,598	1,946	526	602	11,672
Oct.	7,888	1,748	1,041	444	11,121
Nov.	7,786	1,824	894	306	10,810
Dec.	7,837	1,786	968	375	10,966
1956:					
Jan.	7,550	1,757	815	506	10,628

Stocks

1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	115,499	11,349	19,267	4,280	150,395
1955	108,989	12,220	10,500	6,030	137,739
1955:					
Apr.	112,156	10,863	14,813	3,612	141,444
May	109,381	10,283	13,449	3,995	138,108
June	103,844	9,755	13,053	4,042	130,694
July	110,281	11,213	13,288	5,120	139,902
Aug.	108,211	11,326	12,395	5,118	137,050
Sept.	107,746	11,209	12,190	4,995	136,140
Oct.	105,746	11,820	12,146	5,041	134,753
Nov.	105,287	11,530	11,646	5,201	133,664
Dec.	108,136	11,971	10,223	5,300	135,630
1956:					
Jan.	111,263	11,850	12,303	5,880	141,196
Feb.	115,081	12,050	13,056	6,218	146,405

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1944	3,090	6,580	4,683	.....	11,263	14,353
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1955:						
Jan.	7,853	6,199	617	624	7,440	15,293
Feb.	6,110	5,634	797	641	7,072	13,182
Mar.	7,611	7,078	854	672	8,604	16,215
Apr.	8,550	5,680	975	1,022	7,677	16,527
May	8,849	5,292	880	808	6,980	15,829
June	7,736	4,688	905	1,434	7,027	14,763
July	8,702	4,753	641	993	6,387	15,089
Aug.	8,885	4,456	881	917	6,254	15,139
Sept.	8,109	5,698	994	1,086	7,778	18,887
Oct.	6,900	6,231	922	883	8,036	14,936
Nov.	7,085	6,933	1,004	781	8,718	15,803
Dec.	6,018	6,407	962	874	8,243	14,261
1956:						
Jan.	10,328	6,885	848	919	8,652	18,890
Feb.	.....	6,846	930	827	8,603	.....

Consumption[1]

1944	6,085	6,000	4,400	....	10,400	16,485
1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1955:						
Jan.	7,355	4,537	661	506	5,704	13,059
Feb.	7,066	4,881	689	501	6,071	13,137
Mar.	8,415	5,861	828	509	7,198	15,613
Apr.	7,732	5,209	748	601	6,558	14,290
May	6,643	4,728	768	493	5,989	12,632
June	6,589	4,885	722	587	6,194	12,783
July	5,469	3,830	535	626	4,991	10,460
Aug.	6,784	4,514	770	810	6,094	12,878
Sept.	7,452	5,505	730	878	7,113	14,565
Oct.	7,209	5,704	739	614	7,057	14,266
Nov.	6,620	5,954	829	603	7,386	14,006
Dec.	6,473	5,719	768	538	7,025	13,498
1956:						
Jan.	6,395	5,858	772	519	7,149	13,544
Feb.	6,230	6,119	785	780	7,684	13,914

Stocks at End of Period

1944	2,443	....	....	....	....	2,443
1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1955:						
Jan.	9,684	5,861	1,067	812	7,740	17,424
Feb.	8,619	5,753	879	663	7,295	15,914
Mar.	7,820	6,940	909	637	8,486	16,306
Apr.	6,790	7,098	786	703	8,587	15,377
May	8,854	7,021	767	817	8,605	17,459
June	9,788	6,645	817	883	8,335	18,123
July	11,934	6,950	850	1,397	9,197	21,131
Aug.	11,962	6,201	885	1,319	8,405	20,367
Sept.	12,595	6,448	975	1,527	8,950	21,545
Oct.	12,156	5,798	1,075	1,196	8,069	20,225
Nov.	12,616	6,307	1,089	1,174	8,570	21,186
Dec.	12,645	6,357	1,155	1,248	8,760	21,405
1956:						
Jan.	15,529	6,522	1,093	1,339	8,954	24,483
Feb.	16,396	7,045	1,211	1,423	9,679	26,075

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

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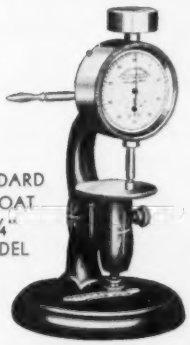

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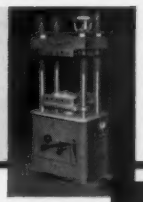

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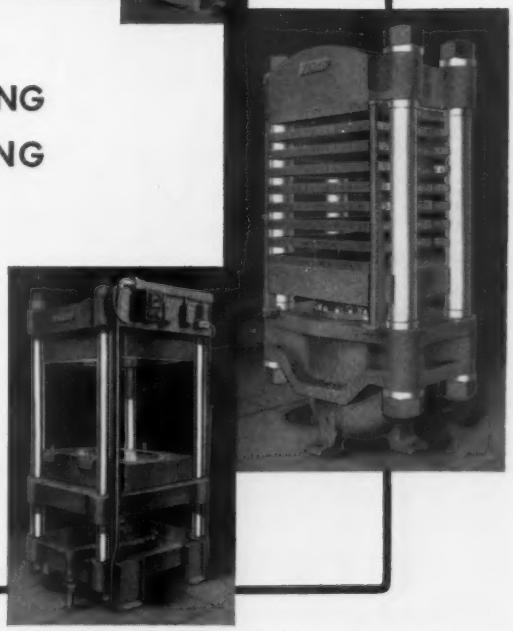

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1954 Production Workers (thousands)	1954 Average Weekly Earnings	1954 Average Weekly Hours	1954 Average Hourly Earnings	1955 Production Workers (thousands)	1955 Average Weekly Earnings	1955 Average Weekly Hours	1955 Average Hourly Earnings
Jan.	203.8	$74.69	38.7	$1.93	208.5	$83.84	41.3	$2.03
Feb.	200.5	75.08	38.9	1.93	209.4	84.25	41.3	2.04
Mar.	196.6	74.31	38.5	1.93	211.6	83.64	41.0	2.04
Apr.	192.4	74.88	38.8	1.93	210.9	86.53	41.8	2.07
May	194.2	77.81	39.7	1.96	215.7	87.36	42.0	2.08
June	195.6	79.60	40.2	1.98	219.0	88.83	42.3	2.10
July	171.0	76.44	39.4	1.94	215.7	86.32	41.3	2.09
Aug.	174.9	75.85	39.1	1.94	216.8	86.32	41.3	2.09
Sept.	196.3	77.42	39.3	1.97	223.1	86.74	41.5	2.09
Oct.	201.6	81.20	40.4	2.01	226.4	89.04	42.0	2.12
Nov.	202.1	83.02	41.1	2.02	231.2	92.01	42.4	2.17
Dec.	206.8	84.85	41.8	2.03	234.1	88.99	41.2	2.16
Tires and Tubes								
Jan.	84.5	82.88	37.5	2.21	85.3	97.41	41.1	2.37
Feb.	82.9	83.03	37.4	2.21	86.5	96.46	40.7	2.37
Mar.	81.9	80.99	36.6	2.21	87.4	95.51	40.3	2.37
Apr.	80.4	84.14	37.9	2.22	88.6	102.18	42.4	2.41
May	81.1	88.65	39.4	2.25	89.8	101.88	42.1	2.42
June	82.2	92.06	40.2	2.29	91.0	105.60	43.1	2.45
July	65.2	87.01	38.5	2.26	91.5	103.33	42.7	2.42
Aug.	65.9	85.65	37.4	2.29	91.0	102.72	42.1	2.44
Sept.	82.6	86.18	38.3	2.25	91.9	101.02	41.4	2.44
Oct.	83.9	90.39	39.3	2.30	92.3	103.74	42.0	2.47
Nov.	81.2	94.54	40.4	2.34	94.2	106.26	42.0	2.53
Dec.	84.5	98.18	41.6	2.36	95.6	98.85	39.7	2.49
Rubber Footwear								
Jan.	21.5	62.98	38.4	1.64	22.1	68.97	40.1	1.72
Feb.	20.5	65.57	39.5	1.66	21.5	69.72	40.3	1.73
Mar.	19.6	65.51	39.7	1.65	21.5	69.72	40.3	1.73
Apr.	19.2	63.58	38.3	1.66	21.3	70.82	40.7	1.74
May	19.8	65.46	39.2	1.67	21.3	70.07	40.5	1.73
June	19.8	67.30	40.3	1.67	21.6	71.34	41.0	1.74
July	20.1	68.45	40.5	1.69	21.8	70.99	40.8	1.74
Aug.	20.5	66.40	40.0	1.66	21.5	67.25	39.1	1.72
Sept.	21.0	66.08	39.1	1.69	23.5	67.60	39.3	1.72
Oct.	21.9	71.34	41.0	1.74	24.4	69.20	40.0	1.73
Nov.	22.3	71.51	41.1	1.74	25.5	77.89	42.1	1.85
Dec.	22.3	71.69	41.2	1.74	25.8	74.12	40.5	1.83
All Other Rubber Products								
Jan.	97.8	70.62	39.9	1.77	101.1	76.08	41.8	1.82
Feb.	97.1	70.40	40.0	1.76	101.4	76.86	42.0	1.83
Mar.	95.1	70.22	39.9	1.76	102.7	76.49	41.8	1.83
Apr.	92.8	69.30	39.6	1.75	101.0	76.54	41.6	1.84
May	93.3	70.98	40.1	1.77	104.6	78.68	42.3	1.86
June	93.6	70.98	40.1	1.77	106.4	77.93	41.9	1.86
July	85.7	70.62	39.9	1.77	102.4	74.37	40.2	1.85
Aug.	88.5	77.15	40.2	1.77	104.3	75.85	41.0	1.85
Sept.	92.7	72.36	40.2	1.80	107.7	78.96	42.0	1.88
Oct.	95.8	74.98	41.2	1.82	109.7	80.56	42.4	1.90
Nov.	98.6	75.71	41.6	1.82	111.5	83.03	42.8	1.94
Dec.	100.0	76.44	42.0	1.82	112.7	83.50	42.6	1.96

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1949	1950	1951	1952	1953	1954	1955	1956
Jan.	33.37	31.89	45.04	42.96	33.24	34.15	35.07	35.24
Feb.	33.41	32.79	(a)	41.64	33.76	35.00	35.04	36.26
Mar.	33.44	32.65	46.06	41.70	34.10	35.23	34.33	36.70
Apr.	33.84	33.23	46.06	41.79	33.85	35.22	34.23	36.81
May	33.73	33.64	46.06	39.98	34.30	35.34	34.80	....
June	33.56	34.61	46.06	41.31	34.11	35.17	34.83	....
July	32.99	38.11	46.21	40.37	34.20	35.37	34.61	....
Aug.	32.06	38.93	35.93	40.42	33.82	35.19	34.53	....
Sept.	30.94	41.62	36.28	39.75	33.69	35.46	33.85	....
Oct.	30.32	40.66	38.13	37.52	33.53	35.24	33.93	....
Nov.	30.52	43.11	42.70	35.59	33.60	34.80	34.87	....
Dec.	31.08	43.37	43.32	33.76	33.52	35.03	34.95	....
Average for Year	32.44	37.05	42.43	39.71	33.81	35.10	34.59	....

Note: The Government established a ceiling price of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1953	1954	1955		1953	1954	1955
Jan.	132	114	145	July	114	85	121
Feb.	140	114	144	Aug.	122	94	133
Mar.	143	118	146	Sept.	122	118	144
Apr.	140	116	147	Oct.	127	132	155
May	137	118	146	Nov.	120	124	150
June	131	121	151	Dec.	111	128	140

Sales by the Rubber Industry

(in Millions of Dollars*)

	1953	1954	1955		1953	1954	1955
Jan.	434	361	424	July	460	393	471
Feb.	442	360	440	Aug.	424	352	456
Mar.	452	378	466	Sept.	414	346	456
Apr.	443	382	445	Oct.	405	346	447
May	443	378	465	Nov.	360	404	482
June	442	385	465	Dec.	372	417	476

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1953	1954	1955		1953	1954	1955
Jan.	839	835	790	July	901	787	853
Feb.	839	848	782	Aug.	888	754	863
Mar.	854	844	805	Sept.	899	799	874
Apr.	857	813	784	Oct.	878	835	902
May	868	798	810	Nov.	865	811	935
June	893	817	850	Dec.	859	821	896

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1914	93	56	65.33	1935	13¾	10½	12.37
1915	79	58½	65.85	1936	23	13½	16.41
1916	102	55	72.50	1937	26⅛	14	19.39
1917	90	52	72.23	1938	17⅞	10¾	14.64
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19½	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28½	13⅝	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅛	17⅜	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21
1933	9⅞	2⅞	5.96	1954	34½	19½	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1949	1950	1951	1952	1953	1954	1955	1956
Jan.	19.23	18.33	71.21	....	29.40	20.22	33.92	41.70
Feb.	18.49	19.40	73.61	....	27.57	19.98	34.90	36.46
Mar.	19.08	19.86	72.05	....	26.59	20.16	31.08	33.68
Apr.	18.53	23.51	....	....	24.66	22.06	31.75	31.74
May	17.92	28.07	....	....	25.52	21.96	31.35	....
June	16.36	30.92	....	....	24.42	23.01	34.74	....
July	16.45	39.10	....	30.52	23.64	24.12	40.84	....
Aug.	16.60	51.63	....	29.36	23.36	23.26	45.85	....
Sept.	17.58	55.98	....	27.42	23.06	23.99	48.27	....
Oct.	16.31	62.19	....	27.26	20.82	26.57	43.81	....
Nov.	16.70	73.05	....	29.25	20.58	28.07	44.95	....
Dec.	17.53	71.20	....	31.26	20.92	29.88	48.40	....
Average for Year	17.57	41.10	(a)	29.15	24.21	23.61	39.16	....

Note: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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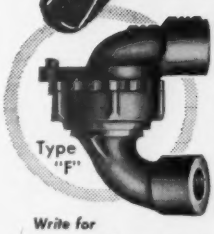

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	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,056	62,871	3,256	91,183	95,550	6,949
Passenger Car.	19,644	52,857	1,608	74,109	77,795	5,444
Truck and Bus	5,412	10,014	1,648	17,074	17,755	1,505
1948 (total)	26,845	49,148	1,787	77,781	81,314	10,698
Passenger Car.	21,589	41,295	656	63,540	66,738	8,773
Truck and Bus	5,256	7,853	1,132	14,241	14,576	1,925
1949 (total)	31,584	43,466	1,467	76,517	76,369	10,638
Passenger Car.	28,129	36,440	509	65,077	65,140	8,904
Truck and Bus	3,456	7,026	958	11,440	11,228	1,734
1950 (total)	41,349	56,808	1,430	99,587	92,754	3,794
Passenger Car	36,678	47,103	642	84,423	78,598	3,050
Truck and Bus	4,671	9,705	788	15,164	14,156	743
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car.	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car.	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car.	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car.	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1955:						
May (total)	4,352	5,361	152	9,865	9,949	14,936
Passenger Car.	3,871	4,705	87	8,663	8,742	12,235
Truck and Bus	481	656	65	1,202	1,208	2,701
June (total)	3,931	6,129	174	10,234	10,703	15,460
Passenger Car.	3,482	5,399	97	8,979	9,383	12,698
Truck and Bus	449	730	76	1,255	1,320	2,763
July (total)	3,890	5,711	128	9,729	9,027	14,684
Passenger Car.	3,461	4,802	76	8,339	7,893	12,199
Truck and Bus	429	909	51	1,389	1,134	2,485
Aug. (total)	3,362	5,980	119	9,462	8,717	13,908
Passenger Car.	2,984	5,058	60	8,103	7,585	11,636
Truck and Bus	378	922	59	1,359	1,132	2,272
Sept. (total)	3,142	5,170	140	8,453	9,125	14,674
Passenger Car.	2,749	4,366	74	7,189	7,882	12,407
Truck and Bus	393	804	66	1,264	1,242	2,267
Oct. (total)	3,495	4,460	161	8,117	9,555	16,163
Passenger Car.	3,172	3,556	74	6,802	8,160	13,806
Truck and Bus	324	904	88	1,315	1,395	2,357
Nov. (total)	4,303	3,592	150	8,045	9,603	17,727
Passenger Car.	3,900	2,902	63	6,865	8,198	15,142
Truck and Bus	403	690	87	1,180	1,405	2,585
Dec. (total)	4,045	3,298	172	7,515	8,478	18,778
Passenger Car.	3,641	2,746	80	6,467	7,223	15,963
Truck and Bus	404	552	91	1,047	1,255	2,815
1956:						
Jan. (total)	3,402	4,669	131	8,203	8,979	19,517
Passenger Car.	2,958	4,040	66	7,064	7,661	16,546
Truck and Bus	444	629	65	1,139	1,318	2,971
Feb. (total)	3,342	3,952	178	7,473	8,897	20,933
Passenger Car.	2,919	3,387	90	6,396	7,571	17,701
Truck and Bus	424	565	88	1,077	1,326	3,232

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1936	3,669,528	781,862	4,451,390	1946	2,148,699	930,760	3,079,429
1937	3,915,889	892,382	4,808,271	1947	3,558,178	1,220,634	4,778,812
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1955:							
Jan.	635,513	89,676	725,189	July	658,736	109,589	768,325
Feb.	677,705	67,061	744,766	Aug.	620,610	95,119	715,729
Mar.	791,280	102,992	894,272	Sept.	467,845	91,894	559,739
Apr.	753,434	127,887	881,321	Oct.	505,177	95,610	600,787
May	721,139	127,941	849,080	Nov.	745,993	114,448	860,441
June	647,658	119,215	766,873	Dec.	695,096	103,586	799,092
1956:							
Jan.	591,032	98,968	690,000	July	.....	.....	.....
Feb.	560,924	102,384	663,308	Aug.	.....	.....	.....
Mar.	583,169	106,381	689,550	Sept.	.....	.....	.....
Apr.	.....	.....	.....	Oct.	.....	.....	.....
May	.....	.....	.....	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	..
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1955:						
June	477	3,003	85	3,565	3,136	7,326
July	475	2,915	60	3,450	2,768	6,664
Aug.	394	3,269	70	3,733	2,923	5,917
Sept.	360	2,814	86	3,261	3,169	5,966
Oct.	319	2,595	89	3,004	3,119	6,286
Nov.	355	2,427	92	2,875	3,052	6,734
Dec.	305	2,289	93	2,686	2,719	6,833
1956:						
Jan.	273	3,263	71	3,608	2,917	6,294
Feb.	273	2,548	100	2,921	2,969	6,547

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,352	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1955:										
Jan.	6,291	4,455	15,441	4,512	4,341	2,288	3,600	2,576	7,705	51,208
Feb.	6,606	4,205	15,748	4,829	4,812	2,285	3,801	2,352	7,761	52,400
Mar.	8,052	4,429	16,102	5,402	5,208	2,815	4,336	2,859	8,865	58,068
Apr.	8,227	4,709	15,568	5,779	5,134	2,601	3,271	2,585	8,967	56,842
May	6,985	4,429	14,452	5,240	5,109	2,449	3,547	2,809	9,237	54,256
June	7,103	3,970	14,832	5,036	4,318	2,139	4,403	2,322	8,508	52,630
July	5,925	3,765	11,943	4,304	3,601	2,027	3,540	2,605	6,919	44,631
Aug.	6,478	3,359	13,265	5,136	4,599	2,105	4,759	2,868	8,799	51,367
Sept.	6,983	4,166	15,412	5,582	4,707	2,313	4,017	3,072	9,129	55,382
Oct.	7,498	4,581	16,067	6,043	5,369	2,290	6,318	2,670	9,836	60,672
Nov.	6,855	4,771	18,224	6,271	4,945	2,147	6,818	2,945	9,831	62,807
Dec.	6,273	4,585	16,682	6,089	4,214	1,980	5,458	2,190	10,087	57,558
1956:										
Jan.	6,496	4,928	16,842	6,176	5,181	2,289	6,584	3,331	10,628	62,455
Feb.	6,849	5,296	16,509	5,187	4,894	1,792	6,185	2,718	8,696	58,126

Source: Chemical Division, U. S. Tariff Commission.

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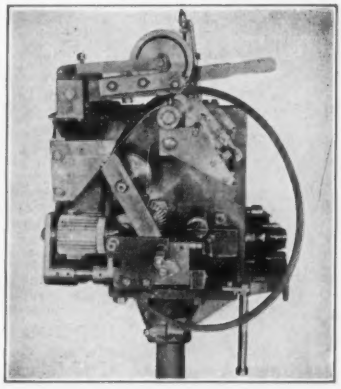
for
Truck and Heavy Service Tires



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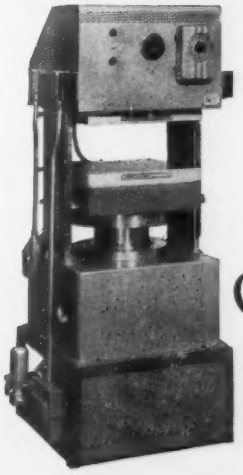

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Various Compounding Materials Consumed by the Rubber Industry

Material	1947	1948	1949	1950	1951	1952	1953
Antimony, Primary:							
Short tons	39	41	55	103[c]	19[c]	66	20
% of total	.002	.003	.005	.007	.001	.004	.001
Asphalt: [a]							
Short tons	32,113	19,967	18,050	26,819	21,414	33,288	.....
% of total	0.7	0.4	0.3	0.3	0.3	0.4	.....
Barite (Barytes):							
Short tons	17,000	18,000	14,000	19,000	15,000	14,000	.....
% of total	3.1	2.85	2.53	3.31	2.13	2.0	.....
Carbon Black:							
Short tons	471,790	435,282	383,565	515,184	530,614	537,273	566,797
% of total	94.3	95.5	93.3	92.9	93.9	93.1	94.4
Clay, Kaolin:							
Short tons	166,201	176,965	197,341	263,306	231,331	240,982	.....
% of total	11.5	11.3	13.1	15.0	12.7	13.2	.....
Clay, Fire & Stoneware:							
Short tons	17,970	15,480	27,148	9,500	.....	9,322	.....
% of total	0.2	0.2	0.3	0.1	.....	0.1	.....
Lime:							
Short tons	589	1,154	715	908	1,126	2,000	.....
% of total	0.01	0.02	.0002	.0002	[d]	[d]	.....
Litharge:							
Short tons	2,205	2,835	1,398	3,047	2,641	2,109	.....
% of total	1.3	1.8	1.2	1.7	1.7	1.5	.....
Lithopone:							
Short tons	3,085	4,192	3,245	4,092	3,295	1,523	1,723
% of total	1.9	3.0	4.1	3.9	3.2	2.5	3.3
Mica, Ground:							
Short tons	3,900	4,372	3,856	5,776	6,551	5,126	.....
% of total	6.0	7.0	7.0	8.0	9.0	7.0	.....
Sulfur:							
Short tons	72,800	70,560	59,360	75,000	75,000	75,000	.....
% of total	1.8	1.7	1.5	1.3	1.6	1.6	.....
Talc: [b]							
Short tons	71,840	66,226	53,400	75,900	70,970	64,476	.....
% of total	13.9	13.0	12.0	12.0	11.2	10.9	.....
Zinc Oxide:							
Short tons	82,248	82,895	58,496	82,944	71,507	72,774	78,439
% of total	51.2	54.9	52.5	51.6	48.4	51.2	52.7

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007 [b]	254,820	64.6	30,405	42,532
1943	304,058 [c]	291,082	59.6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1955:					
Jan.	25,336	25,322	20.2	1,041	29,656
Feb.	25,444	24,333	20.5	1,085	30,125
Mar.	29,574	28,674	21.1	1,088	30,311
Apr.	26,817	26,609	21.3	1,088	30,068
May	27,911	27,652	21.2	1,056	29,528
June	30,451	29,157	21.5	1,128	29,725
July	24,114	22,563	20.6	1,176	29,939
Aug.	25,223	25,790	21.2	1,144	27,956
Sept.	26,512	26,340	20.6	1,018	27,110
Oct.	28,038	26,597	19.7	1,381	27,565
Nov.	29,124	27,229	20.3	1,313	28,473
Dec.	28,153	24,604	20.0	1,347	31,100
1956:					
Jan.	26,205	25,827	19.6	1,382	31,640
Feb.	27,005	25,977	20.5	....	32,404

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production: Rayon Tire Cord Not Woven	Production: Rayon Tire Cord Woven	Production: Cotton and Nylon Cord & Fabric [a]	Production: Chafer Fabrics (all fibers)	Production: Total Tire Cord and Fabric	Stocks [b]: Cotton and Nylon Cord & Fabric	Stocks [b]: Rayon Cord and Fabric
1954:							
Jan.-Mar.	17,297	73,068	7,905	13,228	111,499	n.a.	n.a.
Apr.-June	15,257	63,975	12,424	12,867	104,523	6,975	56,497
July-Sept.	12,851	50,136	8,858	9,321	81,166	7,321	47,572
Oct.-Dec.	14,609	76,931	13,081	12,476	117,097	7,654	47,061
Total	60,014	264,110	42,268	47,893	414,285	....	....
1955:							
Jan.-Mar.	20,299	79,191	14,870	12,763	127,123	6,863	44,239
Apr.-June	21,550	81,036	18,898	12,724	134,208	8,870	40,689
July-Sept.	20,740	81,996	16,093	12,941	131,770	9,679	47,272
Oct.-Dec.	24,343	77,600	15,754	12,333	130,030	9,182	46,636
Total	86,932	319,823	65,615	50,761	523,131	34,594	178,836

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1948	1949	1950	1951	1952	1953	1954	1955
Jan.	61,308	63,125	66,981	80,670	86,863	89,634	89,852	96,397
Feb.	56,487	57,980	53,274	72,864	82,043	86,458	86,206	88,464
Mar.	68,171	73,282	78,780	86,962	87,065	98,158	101,549	105,684
Apr.	72,183	75,318	80,350	87,573	98,653	102,044	103,866	111,116
May	77,186	81,665	89,035	100,266	101,137	105,918	104,418	115,707
June	78,044	83,374	90,174	96,364	99,305	114,703	113,037	120,710
July	81,428	83,129	91,677	100,567	105,307	112,960	112,231	115,653
Aug.	80,351	84,707	94,507	101,453	102,954	109,124	110,223	121,816
Sep.	76,159	80,832	86,725	91,891	100,095	106,158	104,706	113,379
Oct.	75,164	79,327	89,067	100,209	103,689	106,037	105,607	112,558
Nov.	72,560	76,346	82,688	88,581	91,326	99,210	102,393	109,212
Dec.	72,162	75,628	81,032	84,551	95,817	100,225	104,258	111,034
	871,270	913,713	994,290	1,091,951	1,154,254	1,230,629	1,238,346	1,321,730

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1955:						
Apr.	83	58,184	113	122,952	36	32,463
May	44	35,402	121	119,278	52	48,021
June	93	61,821	119	115,511	46	50,901
July	105	66,771	146	163,189	17	16,588
Aug.	67	41,052	124	123,655	13	14,860
Sept.	151	181,535	97	105,884	10	9,295
Oct.	261	254,853	206	213 394	8	12,039
Nov.	11	94,967	97	97,981	12	21,302
Dec.	66	51,938	138	114,286	5	3,318
1956:						
Jan.	49	30,670	112	99,777	9	18,066

Source: U. S. Department of Commerce.

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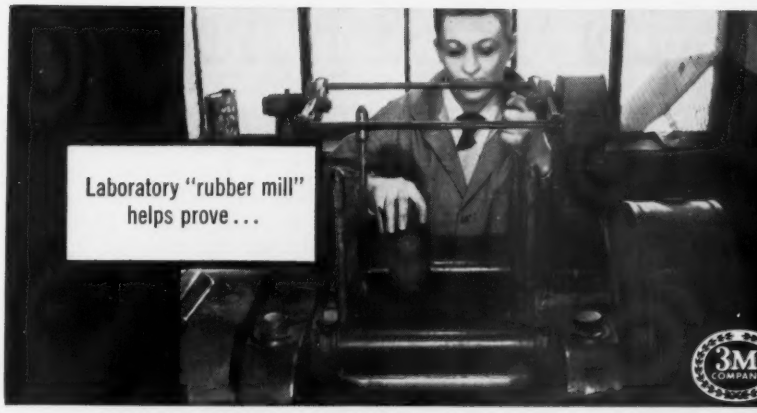

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Index to Advertisers

Accurate Steel Rule Die Manufacturers 343
Adamson United Co. 205
Aetna-Standard Engineering Co. ..... —
Akron Equipment Co. ..... —
Akron Employment Service 366
Akron Rubber Machinery Co. 370
Akron Standard Mold Co. ..... —
Albert, L., & Son 370
Alco Oil & Chemical Corp. 256
Aldrich Pump Co. ..... —
Allied Chemical & Dye Corp. 197, 236-237, 329
American Cyanamid Co.
Intermediate & Rubber Chemical Dept. 241
Pigments Div. 232
American Enka Corp. 200
American Resinous Chemicals Corp. 349
American Viscose Corp. ..... —
American Zinc Sales Co. 229
Ames, B. C., Co. 353
Archer Rubber Co. 368
Argus Chemical Corp. ..... —
Atlas Electric Devices Co. 262

Baker Castor Oil Co. ..... —
Baker, J. T., Chemical Co. 259
Barrett Division, Allied Chem. & Dye Corp. 329
Bedford-Bolling Co., Inc. 370
Bestread Products Co. 368
Black Rock Manufacturing Co. ..... —
Bolling, Stewart, & Co., Inc. ..... —
Brockton Cutting Die & Machine Co., Inc. ..... —
Brooklyn Color Works, Inc. 365
Burgess Pigment Co. 338

Cabot, Godfrey L., Inc. 233, 331
Cambridge Instrument Co., Inc. 351
Carter Bell Manufacturing Co. 347
Cary Chemicals, Inc. ..... —
Celanese Corp. of America 224
Chemical Publishing Co., Inc. ..... —
CLASSIFIED ADVERTISING 366-70
Cleveland Liner & Manufacturing Co. 222
Clifton Hydraulic Press Co. 369
Columbia-Southern Chemical Corp. 196
Columbian Carbon Co. ..... Insert Following 298, 332
Concord Mica Corp. 370
Consolidated Products Co. 370
CONSULTANTS SECTION 368
Continental Carbon Co. ..... Insert Following 248
Continental Machinery Co., Inc. 348
Custom Machine & Design, Inc. ..... —
Coulter, James, Machine Co. 351
Cumberland Engineering Co., Inc. ..... —

D. P. R., Inc 348
Darlington Chemicals, Inc. 351
Davis-Standard Sales Corp. ..... —
Day, J. H., Co. 206
Dayton Rubber Co. 345
Diamond Alkali Co., Pure Calcium Prod. Div. ..... —
Dow Corning Corp. 238
Drake Personnel, Inc. 366
du Pont de Nemours, E. I., & Co., Inc.
Elastomers Div. ..... Second Cover, 239
Durez Plastics & Chemicals, Inc. ..... —

Emery Industries, Inc. 337
Emerson Apparatus Co. ..... —
Engineering Associates, Inc. 369
English Mica Co. ..... —
Enjay Co., Inc. 325
Erie Engine & Manufacturing Co. 359
Erie Foundry Co. ..... —

Falls Engineering & Machine Co. ..... —
Farrel-Birmingham Co., Inc. 221, 255
Ferry Machine Co. 346
Firestone Tire & Rubber Co. 225
Flexo Supply Co., Inc. 361
French Oil Mill Machinery Co. 230

Gammeter, W. F. Co. 365
General Aniline & Film Corp. ..... —
General Electric Co., Silicone Products Dept. ..... —
General Latex & Chemical Corp. ..... —
General Magnesite & Magnesia Co. ..... —
General Tire & Rubber Co. 223
Genseke Brothers 195
Gidley, Philip Tucker 368
Giffels & Vallet, Inc. ..... —
Glidden Co.
Chemicals-Pigments-Metals Div. ..... Insert Following 230
Goodman, G. F., & Son 339
Goodrich, B. F., Chemical Co. 193
Goodrich-Gulf Chemicals, Inc. 228
Goodyear Tire & Rubber Co.
Chemical Div. ..... Insert Following 200
Gross, A., & Co. 330
Gummi und Asbest ..... —

Hale & Kullgren, Inc. 368
Hall, C. P., Co. 333
Harshaw Chemical Co. 248
Harwick Standard Chemical Co. ..... Back Cover
Hercules Powder Co., Inc. ..... —
Heveatex Corp. 353
Hoggson & Pettis Manufacturing Co. ..... —
Holliston Mills, Inc. ..... —
Holmes, Stanley H., Co. ..... —
Howe Machinery Co., Inc. 368
Huber, J. M., Corp. 198

Independent Die & Supply Co. 346
Indoil Chemical Co. 263
Industrial Ovens, Inc. 341
Institution of the Rubber Industry ..... —
Irvington Varnish & Insulator Div. 365

Johnson Corp. 345
Johnson Steel & Wire Co., Inc. 264-265
Johnson Machinery Co. 369

Kautschuk und Gummi ..... —
K. B. C. Industries, Inc. 368
Kellogg, M. W., Co. 217
Kentucky Color & Chemical Co. 336
Kingsbacher-Murphy Co. ..... —
Korbet Corp. 340

Ladd Research Industries, Inc. 368
Lambert, E. P., Co. 343
Lehmann, J. M., Co., William R. Thropp & Sons Div. 218
Litzler, C. A., Co., Inc. 208

Mapico Color Division 332
Marbon Chemical Div. 207
Marine Magnesium Div. ..... —
Maryland Cork Co., Inc. 368
McNeil Machine & Engineering Co. 370
Merck & Co., Inc. ..... —
Monsanto Chemical Co.
Rubber Chemical Dept. 252
Plastics Div. ..... —
Mt. Hope Machinery Co. 353
Mount Vernon Mills, Inc. ..... —
Muehlstein, H., & Co., Inc. 323

National Aniline Div. 197, 236-237
National Chemical & Plastics Co. ..... —
National Forge & Ordnance Co. 355
National Roll & Foundry Co. ..... —
National Rosin Oil Products, Inc. 365
National Rubber Machinery Co. ..... —
National Sherardizing & Machine Co. 368
National-Standard Co. ..... —
Naugatuck Chemical Division
U. S. Rubber Co. 246-247, 254, 266
Nelson Employment Service 366
Neville Chemical Co. 235
New Jersey Zinc Co. 210

Olin Mathieson Chemical Corp. ..... —
Olin, R. R., Laboratories 368
Osborn Manufacturing Co. ..... —

Pan American Chemicals ..... —
Parsons-Plymouth, M. W., Inc. ..... —
Pasadena Hydraulics, Inc. 363
Paterson Parchment Paper Co. 342
Pennsylvania Industrial Chemical Corp. ..... —
Pequanoc Rubber Co. 368
Petro-Tex Chemical Corp. 211
Phillips Chemical Co.
Philblack 194
Philprene 251
Pittsburgh Coke & Chemical Co. 209
Pittsburgh Steel Co. 264-265
Plandex Corp. ..... —
Polychemicals Div., West Virginia Pulp & Paper Co. 355
Polymel Corp. ..... Third Cover
Polymer Corp., Ltd. 327
Progressive Service Co. 361
Pure Carbonic Co. 234

Rand Rubber Co. 368
Randall, Frank E., Co., Inc. 359
Rare Metal Products Co. ..... —
Reliable Rubber & Plastic Machinery Co. 369
Revue Générale du Caoutchouc ..... —
Rhodia, Inc. 334
Richardson, Sid, Carbon Co. 372
Rotex Rubber Co., Inc. ..... —
Royle, John, & Sons 256
Rubber Corp. of America 258
Rubber Age Circulation 365
Rubber Age Books 242, 363
Rubber Journal 361
Rubber Red Book 260

St. Joseph Lead Co. 220
Scott Testers, Inc. 258
Semet-Solvay Petrochemical Div. ..... —
Sharples Chemicals Div. ..... —
Shaw, Francis, & Co., Ltd. ..... —
Shell Chemical Corp. 219
Shell Oil Co. 245
Shiraishi Kogyo Kaisha, Ltd. 367
Simplex Cloth Cutting Machine Co., Inc. ..... —
Skelly Oil Co. 240
Skinner Engine Co. 243
Snell, Foster D., Inc. 343
South Florida Test Service 368
Southern Clays, Inc. 216
Spadone Machine Co. ..... —
Stamford Rubber Supply Co. 345
Stoner's Ink Co. 370
Sun Oil Co. 335
Synvar Corp. ..... —

Tepper, William 370
Taylor Instrument Companies ..... —
Taylor-Stiles & Co. 344
Texas-U. S. Chemical Co. 261
Texo Corp. ..... —
Thiokol Chemical Corp. ..... —
Thomaston Mills 363
Thropp, William R., & Sons, Div.
J. M. Lehmann Co. 218
Titanium Pigment Corp. 244
Tracerlab, Inc. ..... —
Trade News Service ..... —
Turner Halsey Co. ..... —

United Carbon Co., Inc. ..... Insert Following 212
United Clay Mines Corp. ..... —
United Engineering & Foundry Co. 212
United Rubber Machinery Exchange 369
U. S. Rubber Co.
Naugatuck Chemical Div. 246-247, 254, 266
U. S. Rubber Reclaiming Co., Inc. ..... —
Universal Hydraulic Machinery Co. 370
Universal Oil Products Co. 227
Utility Manufacturing Co. 363

Vanderbilt, R. T., Co. ..... Front Cover
Vapor Heating Corp. ..... —
Velsicol Chemical Corp. 253

Washington Rubber Co. 368
Watson-Standard Co. 230
Wellington Sears Co. 226
West Virginia Pulp & Paper Co. 355
Western Supplies Co. 262
White, J. J., Products Co. 355
Whittaker, Clark & Daniels, Inc. ..... —
Williams, C. K., & Co., Inc. ..... —
Witco Chemical Co. ..... Insert Following 248, 257
Woloch, George, Co., Inc. 359
Wood, R. D., Co. 215

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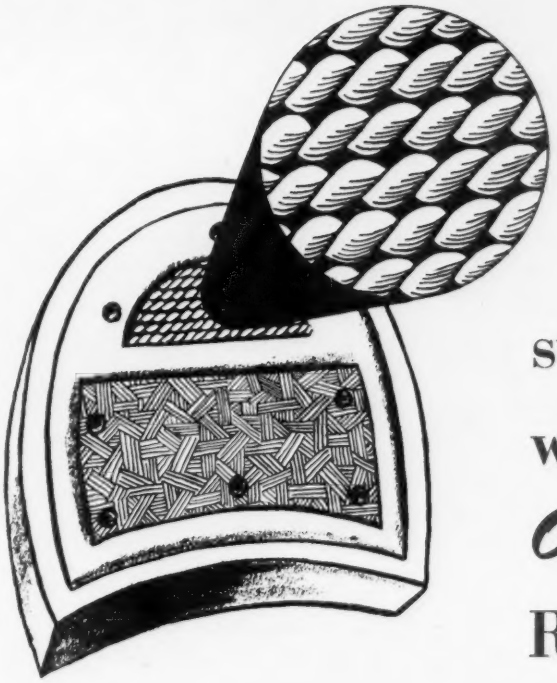

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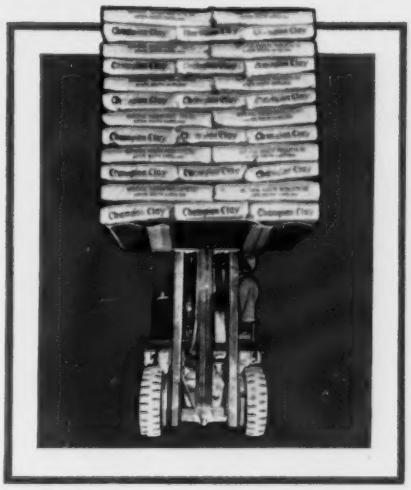

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In This Issue

Tensile and elongation at high temperatures .....page 445

How weather balloons are mass produced page 452

Stress relaxation versus sealability of gaskets ...page 455

Symposium on vulcanization accelerators ..page 459

Letters .....page 384

News Hilites..page 474

Contents .....page 383

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